Ontario's Drive Clean:

A summary of the first three years of light-duty vehicle data (1999-2001)

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In Brief

Ontario's Drive Clean is a mandatory inspection and maintenance program for both light and heavy-duty vehicles. This summary describes results from an independent analysis by Pacific Vehicles Testing Technologies (PVTT) of emissions data collected in the first three years of the non-diesel light-duty vehicle (LDV) component. The data, focusing on results from the dynamometer (treadmill) test were collected from program start-up on January 2, 1999 through to December 31, 2001, which included implementing the program in:

- Phase 1 (Greater Toronto Area and Hamilton)
- Phase 2 (urban and commuter areas from Windsor to Peterborough)

In Phase 1, with mandatory testing from April 1999 to December 2001, Drive Clean facilities performed 4.2 million Drive Clean tests. Some of these vehicles were tested in both 1999 and 2001. Repairs of vehicles failing the Drive Clean test and vehicle retirement, reduced smog-causing emissions of nitrogen oxides (NOx) and volatile organic compounds (VOCs) by an estimated total of 15.2% or 14,800 tonnes, Carbon monoxide (CO) emissions were reduced by an estimated total of 19.8% or 111,000 tonnes. All reductions are calculated relative to 1999 baseline emissions at the start of testing in Phase 1.

In Phase 2, from January to December in the start-up year 2001, Drive Clean facilities performed one million Drive Clean tests. Repairs of vehicles failing the Drive Clean test and vehicle retirement in Phase 2, reduced NOx and VOCs emissions by an estimated total of 6.11% or 3,500 tonnes, and reduced CO by an estimated 8.1%, or 28,300 tonnes, relative to 2001 baseline emissions, when Phase 2 started.

Since Drive Clean start-up in 1999 to the end of 2001, smog-causing emissions have been reduced by an estimated total of 18,300 tonnes, and carbon monoxide by an estimated 139,000 tonnes. As an additional benefit, fuel economy has improved as a result of vehicle repairs, equivalent to about 380,000 fill-ups of average-size vehicles. These fuel savings have reduced the release of carbon dioxide, a greenhouse gas, by an estimated 47,000 tonnes from 1999 to 2001. This is close to half of the long-term goal of reducing carbon dioxide by up to 100,000 tonnes.

Table of Contents

1.0 Purpose 4

2.0 Background 4

3.0 Methodology 9

3.1 Estimating emission reductions 9

3.2 Results 11

3.3 Impact on fuel consumption 13

3.4 Assumptions 14

4.0 Conclusions 16

Appendix: Key Data Tables 17

- **Tables 1A to 1D:** Rates of inspection, failure, reinspection, and waiver by vehicle type and model year for individual vehicles - Phase 1 for years 1999 to 2001, Phase 2 for 2001
- **Tables 2A to 2 D:** Modal failure rates - Phase 1 for years 1999 to 2001, Phase 2 for 2001
- **Tables 3A to 3D:** Calculation of emission reductions by vehicle type and by age group – Phase 1 for years 1999 to 2001, Phase 2 for 2001
- **Tables 4A and 4B:** Overall emission reductions –Phase 1, Phase 2

1.0 Purpose

This report presents an analysis of vehicle emissions data collected under Ontario's Drive Clean program for the period of January 2, 1999 to December 31, 2001. The analysis was used to:

- Quantify emission reductions of nitrogen oxides (NOx), hydrocarbons (HC), and carbon monoxide (CO) from vehicles in the light-duty vehicle (LDV) program area as percentages of vehicle emissions at the start of Drive Clean, and as tonnages; and
- Estimate the effect of fuel savings on reducing emissions of the greenhouse gas, carbon dioxide.

2.0 Background

Emissions from on-road vehicles contribute to both local and long-range environmental problems: primarily smog and climate change, and to a lesser extent, acid rain. Vehicular emissions also exacerbate a number of human health problems and contribute to elevated morbidity and mortality rates in affected populations. Ontario's mandatory vehicle inspection and maintenance program, known as *Drive Clean*, is an effective approach to reducing vehicular emissions.

The primary long-term target of the program is to reduce the emission of smog-causing pollutants (nitrogen oxides and volatile organic compounds) in the program area. Smog-causing emissions include the gases nitrogen oxides (NOx), and hydrocarbons (unburned gasoline, belonging to a group of pollutants called volatile organic compounds or VOCs). Climate change emissions consist of carbon dioxide (CO2), while acid rain emissions contain sulphur (S). Vehicle emissions also include the toxic gas carbon monoxide (CO), as well as particulates.

Federal regulations set emission performance standards for vehicles at the time of their manufacture. Federal test procedure (FTP) standards for new vehicles have progressively tightened to reflect the improvements in emission control systems introduced over the last 20 years. The FTP is a series of emission tests performed on new vehicles, under a variety of ambient conditions and driving cycles which include acceleration, deceleration, and idle. Standards are set each year that all new model vehicles must meet, but only a few vehicles representing each model are tested each year.

Ontario sets on-road emission standards, limiting the release of air contaminants. However, on road vehicle emissions increase over time due to engine wear, improper or irregular maintenance, and tampering with, or failure of the emission control devices. Ontario's vehicle emission standards, based on the FTP standards, have been adjusted to reflect the relative capabilities of both older and contemporary emission control systems and the effects of normal engine wear. Drive Clean tests using a dynamometer (vehicle treadmill) are designed to identify those vehicles that no longer operate in compliance with acceptable emission standards and ensure that the proper corrective action is taken. The data set from dynamometer testing, presented here, is actually a subset of the full Drive Clean data set, which also includes:

- LDV two-speed idle tests, for vehicles that cannot be tested on the dynamometer
- LDV diesel tests, checking vehicles for visual emissions
- HDV non-diesel two-speed idle tests
- HDV opacity (smoke) diesel tests

A ten or 15-year-old vehicle, even one maintained in excellent running condition, cannot match the pollution control efficiencies of today's models. However, when pollution controls fail, any vehicle may become a gross polluter with emissions equivalent to 20 or more properly maintained vehicles.

The Drive Clean requirements are set out in Ontario Regulation 361/98, as amended, under the *Environmental Protection Act*. Emission standards, emission test methods and additional technical information are described in greater detail in the Ontario Ministry of Environment and Energy's *Drive Clean Guide* and the manual *Standard Operating Procedures for Ontario's Drive Clean Facilities as Applied to Light-duty vehicles and Non-Diesel Heavy Duty Vehicles.* For the period of this report (1999 to 2001), the emission standards did not change (e.g., a 1988 vehicle would have been tested in 1999 and 2001 using identical emission standards for NOx, HC, and CO).

Enforcement of the emissions test requirements is done through Ontario Regulation 628 under the *Highway Traffic Act*. The regulation states that light-duty vehicles (LDVs) with a registered gross weight of 4,500 kilograms or less (mainly passenger cars, sports utility vehicles, vans and light trucks) must obtain an emissions inspection report in the following situations:

- As a requirement to renew the vehicle's licence plate sticker every two *years:* This requirement applies to LDVs more than three model years but less than 20 model years old.

- As a requirement to complete the ownership transfer, and plate a resale vehicle that is older than the current model year but less than 20 model years old.

Vehicles may be tested more than once in any given period for several reasons:

- a vehicle failing to meet emission standards requires retesting (may be retested as soon as within the same day, and a vehicle may have several retests);
- a vehicle passing a test for sticker renewal would require another test for ownership transfer any time after the 12 month validity of the pass report , and vice versa;
- a vehicle obtaining a conditional pass for sticker renewal would require another test for ownership transfer even the next day as a full pass is required;
- a vehicle coming up for licence plate sticker renewal in subsequent two-year cycles require retesting (e.g., Phase 1 vehicles requiring a test in 1999 and again in 2001);
- quality control and quality assurance checks (audits), and other miscellaneous tests.

In the following discussions, vehicles were only counted once at the “initial test” within the given period, no matter how many other tests were done on the same vehicles. Conversely, total number of tests includes all tests done to all vehicles within the given period.

Although LDV Drive Clean emission testing began on January 2, 1999, in the Phase 1 program area (the Greater Toronto Area and the former Hamilton-Wentworth Region, now the City of Hamilton), it was not until April 1,1999, that a Drive Clean pass became mandatory for registration renewal and ownership transfer. Thus, the number of vehicles tested in 1999 was an estimated 75% of the total available fleet (even model years from 1980 to 1996) in the Phase 1 program area. In 2000 the total available fleet (odd model years from 1981 to 1997) was tested, and in 2001 the total available fleet (even model years from 1982 to 1998) was tested, in the Phase 1 area. In the first two complete calendar years of testing in Phase 1 (2000 and 2001), more than 2.5 million vehicles received initial inspections.

Phase 2 of the LDV Drive Clean program became mandatory on January 1, 2001 in urban and commuter areas in southern Ontario from Windsor to Peterborough. In 2001, the total available fleet (even model years from 1982 to 1998) of almost 0.8 million vehicles, received initial inspections.

Data gathered for this analysis are from LDVs registered in the Phase 1 area in 1999 to 2001, and LDVs registered in the Phase 2 program area in 2001.

The LDV inspection process consists of the following basic steps:

- a pre-test check to ensure the suitability and safety of testing the vehicle on a dynamometer (non-compliant vehicles were rejected from testing at this stage) and an advisory check of the on-board diagnostic light for 1998 and newer vehicles (vehicles were not rejected from testing based on this check);
- a visual inspection of the emissions control system; and
- a sophisticated, tamper-proof emissions test to determine emission levels of nitrogen oxides (NOx), hydrocarbons (HC), and carbon monoxide (CO) in the exhaust stream.

The emissions tests were done on a chassis dynamometer (vehicle treadmill) that simulates the load applied to a vehicle as it climbs a grade of about three per cent, at a steady 40 kilometres per hour. If the vehicle cannot be tested on a dynamometer (e.g., full-time, all-wheel drive), then the tailpipe emissions was measured at two operating conditions: a steady 2,500 RPM and at curb idle. As the dynamometer test better reflects on-road emission performance, results from the two-speed idle test are not reported here; two-speed idle results support the following results and conclusions.

Vehicles that do not meet the emission levels or "cut points" established for a particular model, make and year, must be repaired and re-tested until they pass or receive a conditional pass.

To split the test fleet equally between the two test years in the biennial cycle, odd model-year vehicles are tested in an even calendar year; even model-year vehicles are tested in an odd calendar year. Thus, in 1999, even model year vehicles from 1980 to 1996 were tested for registration renewal; in 2000, odd model year vehicles from 1981 to 1997 were tested; in 2001, even model year vehicles from 1982 to 1998 were tested. Because the test requirement is biennial, only about half the total fleet in each program area, plus up to another 20% to account for re-sale vehicles, was actually tested in any 12-month period.

The LDV program design predicted that 80% of the fleet would pass the initial Drive Clean test and 15% to 20% of the remaining fleet would require repairs and a re-test. A portion of the failed vehicles would fail again and be eligible for conditional passes because repair costs exceeded the repair cost limit (RCL). A further portion would be retired or transferred outside of the program area. Over time, the failure rate is expected to drop with:

- motorists better maintaining their vehicles,
- motorists conducting repairs prior to the initial Drive Clean test,
- improved repair technician skills, preventing, or detecting and correcting problems with vehicle emission control systems.

In 1999 and 2000 vehicle owners could qualify for a $200 Repair Cost Limit for vehicles that failed the re-test, in order to renew their registrations (the RCL does not apply to resale vehicles). In 2001, the RCL increased to $450 in the Phase 1 area, while Phase 2 had its first of two years with the $200 RCL. In effect, the vehicle owner is provided with a two-year grace period with the $200 RCL, to make necessary emission system repairs. After the first two years in any program area, the RCL increases to $450 so that most vehicles can be fully repaired. This feature, common to many vehicle emissions inspection and maintenance programs in North America, was designed to soften the financial impact of repairs on low-income vehicle owners.

Vehicle inspections and repairs are conducted by Drive Clean certified emissions inspectors and repair technicians at Drive Clean Facilities, which are accredited by the Ministry of Environment and Energy.

3.0 Methodology

The emissions and vehicle data collected at Drive Clean facilities is automatically uploaded to a central computer database, known as the Drive Clean Vehicle Emission Transaction System (VETS). The VETS information may be analyzed internally for purposes of quality assurance and quality control, to detect any evidence of fraud, and in order to assess the effectiveness of the program. The data are also accessed by the Ontario Ministry of Transportation through the Vehicle Registration System and used at vehicle licensing offices to process vehicle registrations.

Pacific Vehicle Testing Technologies (PVTT) services were retained by the Ontario Ministry of Environment and Energy's Drive Clean Office for direct evaluation of the emissions and vehicle data collected from January 2, 1999 through to December 31, 2001. PVTT used the same vehicle emission factors and calculation procedure as was used in the preliminary review of year one data (1999) of the Drive Clean program.

3.1 Estimating emission reductions

In calculating the emissions reductions from Ontario's LDV Drive Clean program, each vehicle in the fleet was allocated both a pre- and a post-inspection and maintenance (I/M) mass emission factor expressed in grams/kilometre. The emission reduction is simply the difference between the total pre-I/M and total post-I/M emissions.

For each model year and vehicle type, calculations included vehicles that:

- passed,
- failed in each of the possible failure modes (i.e., which of the emission standards they were unable to meet),
- passed on re-inspection,
- were granted a conditional pass, or
- had not returned for a re-inspection.

It is impossible to know how many vehicles which failed an inspection but had not yet returned to be re-inspected retired from the program, so it has been assumed that they will all eventually achieve either a pass or a conditional pass.

Initial (pre-I/M) annual emissions were calculated by multiplying the number of vehicles in the fleet (whether passing, failing, or exempt from emission testing) by the initial condition (grams/kilometre) and by the annual average distance driven for the model year.

Final (post-I/M) annual emissions were calculated similarly, but the calculation was more complex as it comprised the sum of: vehicles which did not change, those that achieved a "good" repair (pass) and those that achieved a "bad" repair (fail). Using HC as an example, this is how the aggregate calculation was done for each parameter:

$$\%\ \text{Reduction}_{HC} = 100 \times (\text{Initial}_{HC} - \text{Final}_{HC}) / \text{Initial}_{HC}$$

where:

$$\text{Initial}_{HC} = \underset{\text{passing vehicles}}{\Sigma\ \text{g/km x km/year}} + \underset{\text{failing vehicles}}{\Sigma\ \text{g/km x km/year}} + \underset{\text{exempt vehicles}}{\Sigma\ \text{g/km x km/year}}$$

and:

$$\text{Final}_{HC} = \underset{\text{passing vehicles}}{\Sigma\ \text{g/km x km/year}} + \underset{\text{repaired vehicles}}{\Sigma\ \text{g/km x km/year}} + \underset{\text{exempt vehicles}}{\Sigma\ \text{g/km x km/year}}$$

Smog-causing emissions include gases nitrogen oxides (NOx), and hydrocarbons (HC; unburned gasoline, belonging to a group of pollutants called volatile organic compounds or VOCs). The combined percentage reduction of smog-causing emissions was calculated as follows:

$$100 \times \frac{\text{inventory tonnes VOCs} \times \text{\% reduction VOCs} + \text{inventory tonnes NOx \% reduction NOx}}{\text{inventory tonnes VOC} + \text{inventory tonnes NOx}}$$

These percentage emission reductions are based on direct tailpipe measurements before and after repairing **failing** vehicles, applied to emissions from **all** of the vehicles in each Phase (not tested, passed, failed).

On-road emissions (tonnes) were calculated for each of the gases for all vehicles in each Phase, using the United States Environmental Protection Agency's (EPA) Mobile 5 vehicle emissions model, modified for use with Canadian vehicles. On-road tonnage reductions were then calculated by assuming the percentage reductions also applied to on-road emissions from all vehicles in each Phase.

The new Mobile 6 model, currently being evaluated by the EPA and Environment Canada, is expected to produce a higher figure for vehicular emissions in the near term. The Mobile 6 model is also expected to predict reduced vehicle emissions for later years (post 2005) when vehicles with newer emission control technologies form a larger part of the Ontario vehicle population.

3.2 Results

Phase 1

In Phase 1, from 1999 to 2001, 4.2 million inspections were performed. In the first three years of Phase 1, the percentage of vehicles that failed the initial test dropped from 16.4% (1999) to 14.0% (2000) to 12.4% (2001) on an annual basis.

The drop in failure rate is attributed to three key factors:

- expedited retirement of gross polluters, and replacement with cleaner vehicles,

- improved vehicle maintenance between tests, and possibly repairs done just prior to the tests in the years 2000 and 2001,
- emission-related repairs done in previous years that were still effective at the next test for registration renewal or resale.

Drive Clean has directly influenced these factors since:

- owners now have an economic incentive to drive vehicles with cleaner emissions,
- the automotive service industry is becoming proficient in maintaining and repairing emission control systems on vehicles.

By the end of the reporting period in Phase 1, 96% of all vehicles passed the initial test or passed after full repairs were performed on failing vehicles. Of the remaining 4% of failing vehicles, half had partial repairs and used the Repair Cost Limit (RCL) to obtain a conditional pass, and the other half had still not passed or received a conditional pass.

Phase 2

In Phase 2, during the start-up year 2001, almost 1 million inspections were performed, with 14.7% of these vehicles failing their initial emissions test. By the end of the reporting period in Phase 1, 93% of all vehicles passed after full repairs were performed on failing vehicles. Of the remaining 7% of failing vehicles, over 4 % had partial repairs and used the Repair Cost Limit (RCL) to obtain a conditional pass, and less than 3% had still not passed or received a conditional pass.

Results as Percentage

- Since Drive Clean began in Phase 1 (1999-2001) emission reductions were:
    - 8.3% % NOx
    - 21.3 % VOCs (HC)
    - 15.2 % NOx plus VOCs
    - 19.8 % CO

- Since Drive Clean began in Phase 2 (2001) emission reductions were:
    - 2.9 % NOx
    - 9.1 % HC

    - 6.11 % NOx plus VOCs
    - 8.1 % CO

Results as Tonnage

- Phase 1 (1999-2001):
    - smog-causing emissions were reduced by an estimated total of 14,800 tonnes;
    - CO emissions were reduced by an estimated 111,0000 tonnes relative to 1999 baseline emissions.

- Phase 2 (2001):
    - smog-causing emissions were reduced by an estimated 3,500 tonnes
    - CO emissions were reduced by an estimated 28,300 tonnes relative to 2001 baseline emissions.

- Since Drive Clean began in both Phases:
    - smog-causing emissions were reduced by an estimated total of 18,300 tonnes;
    - CO emissions were by an estimated total of 139,000 tonnes

3.3 Impact on fuel consumption

PVTT has developed a methodology for determining how fuel consumption can be affected by the repairs intended to correct an emissions problem (see *AirCare Program Review and Evaluation of Benefits, Years One to Five*, Insurance Corporation British Columbia, December 1998). Although it is normal to expect such repairs to improve fuel consumption, in some cases a "good" repair can actually result in increased fuel consumption. Taking this into account, the average fuel consumption improvement for all repaired vehicles can be estimated as 2.26%.

During the first three years of Drive Clean, 547,471 vehicles failed their initial emissions test and are assumed to have been repaired partially, or completely. Some of the vehicles will never be repaired but will be retired and replaced with vehicles that pass the Drive Clean emissions test and have better fuel economy. The average annual travel distance for this group is 15,300 km. If average fuel consumption is estimated at 10 litres/100 km, the annual fuel savings would be 19 million litres (2.26% of 547,471 vehicles X 15,300 km per vehicle X 10 litres/100 km) or about 380,000 fill-ups of an average sized car.

This equates to a reduction in carbon dioxide emissions of approximately 47,000 tonnes (assuming that 2.5 kilograms of carbon dioxide result from the combustion of each litre of fuel) during 1999 to 2001. This is almost half of the goal to reduce carbon dioxide emissions by up to 100,000 tonnes.

3.4 Assumptions

This technical summary assumes that Ontario vehicles would perform similar to British Columbia vehicles. This is reasonable, since vehicles across Canada are built to the same federal emission standards and Ontario's ASM testing equipment and procedures are similar to those of B.C.

There are two important findings from testing approximately 3.4 million vehicles in Ontario:

1) vehicles could pass easily if they were properly maintained (vehicles of all makes, models and years which passed the inspection initially, or were repaired, often had final emission results far below the cut points, indicating that similar vehicles which were failing the inspection were gross polluters with repairable emissions problems);
2) vehicles which failed, continued to fail if no repairs were done (with the exception of a few borderline vehicles and vehicles with intermittent emission control problems; in both these cases, repairs were needed).

PVTT emission reduction estimates were based on direct measurements of vehicle emissions at initial and subsequent tests, and included expected emission vehicle retirements. Drive Clean and car retirement programs such as Car Heaven undoubtedly are accelerating the replacement of older vehicles with newer vehicles that have cleaner emission control technologies. It is very difficult to separate the program-induced retirement rate from the status-quo vehicle retirement rate, which depends on the state of the economy and many other factors.

Direct tailpipe emission measurements were made at a constant speed (40 kilometres/hour) under controlled conditions at testing facilities. Actual on-road emissions are influenced by many factors, including vehicle kilometres travelled, cold starts, driving habits, traffic (including stop and go conditions), rapid acceleration, driving speed, maintenance of the emission control system in non-testing years, tire inflation, load carried, hills, and pollution from other parts of the vehicle (e.g., gasoline escaping from the fuel system and gas cap). While it is obvious that vehicles emit a greater amount of pollutants while being driven on the road than during the Drive Clean test, it is assumed that the estimated percentage emission reductions from Drive Clean repairs apply equally to both operating modes.

Emission reductions reported here do not take credit for vehicle maintenance or repairs that were carried out prior to the initial test or between test cycles by vehicle owners. No assumptions are made about the extent of these unmeasured Drive Clean benefits, but they are likely substantial. These estimates of reductions also tend to be on the low side because the test is designed to end early if all three test gases drop anywhere below the emission standards (i.e., test ends as the final gas drops below the standard). If the test had continued, the emission gases from each vehicle may have ended up well below the emission standards.

Emissions standards for Ontario were chosen so that only gross emitters would fail the test, regardless of model year. Vehicles passing the initial test, or repaired vehicles, could become gross emitters before the next test is due (two year test cycle), which would mean that emissions are actually higher than estimated. This is covered to some extent by a very conservative estimate of the benefit carried over to subsequent years from repairs done in the calendar year 1999 or 2000 in Phase 1. And without the biennial Drive Clean test requirement, these vehicles would continue on Ontario roads indefinitely as gross polluters.

Vehicles with intermittent faults can also have some impact on emission reduction results. Such vehicles may pass the test (even though by definition these vehicles are “faulty”, and should fail all the time, “intermittent” means they may pass sporadically), or fail the test but be improperly repaired and then pass the test by chance.

Both false passes could result in estimating emission reductions on the high side. While vehicles with intermittent faults do exist, re-tests of thousands of failing vehicles indicate that vehicles with intermittent faults are relatively rare - the vast majority of vehicles failing a test continue to fail re-tests consistently until repairs are done.

4.0 Conclusions

The analysis of data collected in the first three years of Ontario's Drive Clean program for light-duty vehicles (LDVs) indicates that the mandatory inspection and maintenance program has achieved substantial reductions in the emissions of contaminants that contribute to photochemical smog and other environmental problems. Drive Clean is progressively reducing emissions by cleaning up existing vehicles and expediting the replacement of gross polluters with vehicles that have better emission control technologies.

APPENDIX
KEY DATA TABLES

List of Tables:

- Tables 1A to 1D: Rates of inspection, failure, reinspection, and waiver by vehicle type and model year for individual vehicles - Phase 1 for years 1999 to 2001, Phase 2 for 2001
- Tables 2A to 2 D: Modal failure rates - Phase 1 for years 1999 to 2001, Phase 2 for 2001
- Tables 3A to 3D: Calculation of emission reductions by vehicle type and by age group – Phase 1 for years 1999 to 2001, Phase 2 for 2001
- Tables 4A and 4B: Overall emission reductions –Phase 1, Phase 2

TABLE 1A: PHASE 1 – 1999: Rates of inspection, failure, reinspection, and waiver by vehicle type and model year for individual vehicles (mandatory testing started April 1999)

		Number of vehicles						% of inspected	% of failed	% of reinspected		
vehicle	Model	inspected	failed	reinspected	passed	waivered	failed	failure	reinspection	reinspection	reinspection	reinspection
type	year				reinspection		reinspection	rate	rate	pass rate	waiver rate	fail rate
P	1980	2161	1160	955	458	316	330	53.7	82.3	48	33.1	34.6
P	1981	1295	666	482	338	71	188	51.4	72.4	70.1	14.7	39
P	1982	4990	2626	2211	1056	731	805	52.6	84.2	47.8	33.1	36.4
P	1983	2201	1076	782	568	90	294	48.9	72.7	72.6	11.5	37.6
P	1984	20040	10715	9187	4616	2783	3405	53.5	85.7	50.2	30.3	37.1
P	1985	8861	4182	2990	2112	457	1240	47.2	71.5	70.6	15.3	41.5
P	1986	56429	23910	20221	10825	5773	7214	42.4	84.6	53.5	28.5	35.7
P	1987	20725	7156	5209	3901	565	2104	34.5	72.8	74.9	10.8	40.4
P	1988	100425	26346	22157	12870	5833	7342	26.2	84.1	58.1	26.3	33.1
P	1989	30539	6487	4678	3725	393	1658	21.2	72.1	79.6	8.4	35.4
P	1990	108497	17410	14809	9518	3390	4487	16	85.1	64.3	22.9	30.3
P	1991	27448	3904	3029	2492	228	1000	14.2	77.6	82.3	7.5	33
P	1992	105908	14087	12043	7930	2626	3738	13.3	85.5	65.8	21.8	31
P	1993	24289	2262	1762	1458	130	592	9.3	77.9	82.7	7.4	33.6
P	1994	92638	3993	3516	2592	559	935	4.3	88.1	73.7	15.9	26.6
P	1995	28452	755	675	582	30	158	2.7	89.4	86.2	4.4	23.4
P	1996	83368	1256	1220	1027	75	222	1.5	97.1	84.2	6.1	18.2
P	1997	32549	474	435	391	10	99	1.5	91.8	89.9	2.3	22.8
P	1998	19014	125	125	112	5	7	0.7	100	89.6	4	5.6
P	1999	10989	59	56	50	3	3	0.5	94.9	89.3	5.4	5.4
T	1980	458	224	198	100	51	74	48.9	88.4	50.5	25.8	37.4
T	1981	231	84	62	41	14	18	36.4	73.8	66.1	22.6	29
T	1982	683	313	288	157	72	97	45.8	92	54.5	25	33.7
T	1983	229	112	81	60	11	28	48.9	72.3	74.1	13.6	34.6
T	1984	2475	1254	1080	488	356	408	50.7	86.1	45.2	33	37.8
T	1985	1240	624	429	304	59	183	50.3	68.8	70.9	13.8	42.7
T	1986	7900	3554	3109	1499	985	1169	45	87.5	48.2	31.7	37.6
T	1987	3199	1337	1020	761	122	398	41.8	76.3	74.6	12	39
T	1988	18568	6037	5382	3169	1367	1755	32.5	89.2	58.9	25.4	32.6
T	1989	5875	1578	1240	987	110	437	26.9	78.6	79.6	8.9	35.2
T	1990	19623	4161	3701	2516	728	1057	21.2	88.9	68	19.7	28.6
T	1991	4970	636	521	435	30	155	12.8	81.9	83.5	5.8	29.8
T	1992	19444	3821	3481	2153	868	1124	19.7	91.1	61.9	24.9	32.3
T	1993	5653	772	598	478	51	190	13.7	77.5	79.9	8.5	31.8
T	1994	22855	1020	962	711	161	253	4.5	94.3	73.9	16.7	26.3
T	1995	8058	275	232	190	17	72	3.4	84.4	81.9	7.3	31
T	1996	26827	349	343	281	34	92	1.3	98.3	81.9	9.9	26.8
T	1997	10145	70	85	76	2	17	0.7	121.4	89.4	2.4	20
T	1998	4297	36	34	30		4	0.8	94.4	88.2		11.8

TABLE 1A: PHASE 1 – 1999: Rates of inspection, failure, reinspection, and waiver by vehicle type and model year for individual vehicles (mandatory testing started April 1999)

		Number of vehicles						% of inspected	% of failed	% of reinspected		
vehicle type	Model year	inspected	failed	reinspected	passed reinspection	waivered	failed reinspection	failure rate	reinspection rate	reinspection pass rate	reinspection waiver rate	reinspection fail rate
T	1999	2930	12	14	12			0.4	116.7	85.7		
H	1980	15	2	4	1		1	13.3	200	25		25
H	1981	7		1								
H	1982	23	8	5	1	1	2	34.8	62.5	20	20	40
H	1983	4										
H	1984	77	23	27	12	7	9	29.9	117.4	44.4	25.9	33.3
H	1985	33	13	8	2	1	4	39.4	61.5	25	12.5	50
H	1986	203	78	70	41	14	22	38.4	89.7	58.6	20	31.4
H	1987	91	42	33	20	5	16	46.2	78.6	60.6	15.2	48.5
H	1988	425	155	144	64	47	45	36.5	92.9	44.4	32.6	31.3
H	1989	224	82	67	48	11	15	36.6	81.7	71.6	16.4	22.4
H	1990	525	145	138	86	35	35	27.6	95.2	62.3	25.4	25.4
H	1991	124	41	30	25	6	6	33.1	73.2	83.3	20	20
H	1992	332	103	87	63	14	20	31	84.5	72.4	16.1	23
H	1993	103	31	28	20	5	8	30.1	90.3	71.4	17.9	28.6
H	1994	461	141	116	75	22	46	30.6	82.3	64.7	19	39.7
H	1995	215	54	43	35	11	16	25.1	79.6	81.4	25.6	37.2
H	1996	483	104	87	52	28	31	21.5	83.7	59.8	32.2	35.6
H	1997	138	7	6	7		1	5.1	85.7	116.7		16.7
H	1998	96		1								
H	1999	43		1	1					100		

TABLE 1B: PHASE 1 – 2000: Rates of inspection, failure, reinspection, and waiver by vehicle type and model year for individual vehicles

		Number of vehicles						% of inspected	% of failed	% of reinspected		
vehicle	model	inspected	failed	reinspected	passed	waivered	failed	failure rate	reinspection rate	Reinspection	reinspection	reinspection
type	year				reinspection		reinspection			pass rate	waiver rate	fail rate
P	1980	307	171	136	70	46	39	55.7	79.5	51.5	33.8	28.7
P	1981	5042	2539	2196	1157	825	525	50.4	86.5	52.7	37.6	23.9
P	1982	1442	682	510	346	113	147	47.3	74.8	67.8	22.2	28.8
P	1983	8344	3888	3376	1903	1187	801	46.6	86.8	56.4	35.2	23.7
P	1984	5678	2743	1923	1295	399	612	48.3	70.1	67.3	20.7	31.8
P	1985	30522	14086	11988	6710	4153	3078	46.2	85.1	56	34.6	25.7
P	1986	17013	6490	4673	3390	775	1510	38.1	72	72.5	16.6	32.3
P	1987	71619	24166	20405	12226	6414	5272	33.7	84.4	59.9	31.4	25.8
P	1988	32550	8991	6537	5021	883	2059	27.6	72.7	76.8	13.5	31.5
P	1989	114432	22869	19172	12459	5296	4643	20	83.8	65	27.6	24.2
P	1990	36385	6541	4753	3780	530	1340	18	72.7	79.5	11.2	28.2
P	1991	117200	16336	13676	9518	3313	3023	13.9	83.7	69.6	24.2	22.1
P	1992	35048	5596	4172	3316	516	1244	16	74.6	79.5	12.4	29.8
P	1993	113745	10910	9091	6513	2052	2032	9.6	83.3	71.6	22.6	22.4
P	1994	28985	1762	1311	1071	134	335	6.1	74.4	81.7	10.2	25.6
P	1995	117873	3509	2948	2199	548	656	3	84	74.6	18.6	22.3
P	1996	29947	818	669	586	43	138	2.7	81.8	87.6	6.4	20.6
P	1997	124854	2313	1977	1708	160	355	1.9	85.5	86.4	8.1	18
P	1998	33561	256	225	205	2	29	0.8	87.9	91.1	0.9	12.9
P	1999	19515	194	186	174	5	22	1	95.9	93.5	2.7	11.8
P	2000	9294	30	24	23			0.3	80	95.8		
T	1980	122	67	60	30	18	17	54.9	89.6	50	30	28.3
T	1981	1219	501	460	238	162	114	41.1	91.8	51.7	35.2	24.8
T	1982	332	154	110	74	21	30	46.4	71.4	67.3	19.1	27.3
T	1983	1250	521	456	236	171	105	41.7	87.5	51.8	37.5	23
T	1984	1061	515	397	240	96	135	48.5	77.1	60.5	24.2	34
T	1985	5954	2837	2451	1270	936	623	47.6	86.4	51.8	38.2	25.4
T	1986	3555	1458	1084	713	217	351	41	74.3	65.8	20	32.4
T	1987	16212	6590	5737	3259	1968	1482	40.6	87.1	56.8	34.3	25.8
T	1988	8283	2634	2031	1487	328	608	31.8	77.1	73.2	16.1	29.9
T	1989	31248	8333	7269	4677	2053	1714	26.7	87.2	64.3	28.2	23.6
T	1990	9262	1918	1469	1169	180	381	20.7	76.6	79.6	12.3	25.9
T	1991	29791	4267	3743	2690	846	729	14.3	87.7	71.9	22.6	19.5
T	1992	9525	1804	1392	1086	209	365	18.9	77.2	78	15	26.2
T	1993	37052	5598	4954	3566	1181	1048	15.1	88.5	72	23.8	21.2
T	1994	10317	567	458	382	38	116	5.5	80.8	83.4	8.3	25.3
T	1995	44362	1401	1273	898	296	321	3.2	90.9	70.5	23.3	25.2
T	1996	13105	249	209	184	8	47	1.9	83.9	88	3.8	22.5
T	1997	47142	478	467	386	47	76	1	97.7	82.7	10.1	16.3

TABLE 1B: PHASE 1 – 2000: Rates of inspection, failure, reinspection, and waiver by vehicle type and model year for individual vehicles

		Number of vehicles						% of inspected	% of failed	% of reinspected		
vehicle type	model year	inspected	failed	reinspected	passed reinspection	waivered	failed reinspection	failure rate	reinspection rate	Reinspection pass rate	reinspection waiver rate	reinspection fail rate
T	1998	19065	125	106	96	1	17	0.7	84.8	90.6	0.9	16
T	1999	5050	25	22	18		3	0.5	88	81.8		13.6
T	2000	3574	11	9	9		1	0.3	81.8	100		11.1
H	1980	3	1					33.3				
H	1981	26	7	10	6		2	26.9	142.9	60		20
H	1982	9	3	2		2	1	33.3	66.7		100	50
H	1983	44	17	18	12	1	5	38.6	105.9	66.7	5.6	27.8
H	1984	32	7	9	6		1	21.9	128.6	66.7		11.1
H	1985	126	50	53	31	9	15	39.7	106	58.5	17	28.3
H	1986	70	33	29	16	7	8	47.1	87.9	55.2	24.1	27.6
H	1987	328	125	119	65	39	27	38.1	95.2	54.6	32.8	22.7
H	1988	145	54	46	30	9	14	37.2	85.2	65.2	19.6	30.4
H	1989	585	183	152	104	37	41	31.3	83.1	68.4	24.3	27
H	1990	210	55	42	26	8	11	26.2	76.4	61.9	19	26.2
H	1991	413	115	98	62	25	21	27.8	85.2	63.3	25.5	21.4
H	1992	153	33	28	17	8	7	21.6	84.8	60.7	28.6	25
H	1993	412	118	103	72	25	32	28.6	87.3	69.9	24.3	31.1
H	1994	170	47	37	28	8	7	27.6	78.7	75.7	21.6	18.9
H	1995	798	214	173	133	34	46	26.8	80.8	76.9	19.7	26.6
H	1996	234	53	44	26	15	18	22.6	83	59.1	34.1	40.9
H	1997	855	80	65	47	15	21	9.4	81.3	72.3	23.1	32.3
H	1998	198	3	1	1			1.5	33.3	100		
H	1999	144										
H	2000	41										

Table 1C: Phase 1- 2001: Rates of inspection, failure, reinspection, and waiver by vehicle type and model year for individual vehicles

		number of vehicles						% of inspecte	% of failed	% of reinspected		
vehicle	model	inspected	failed	reinspected	passed	waivered	failed	failure rate	reinspection rate	reinspection	reinspection	reinspection
type	year				reinspection		reinspection			pass rate	waiver rate	fail rate
P	1980	70	35	30	10	13	10	50	85.7	33.3	43.3	33.3
P	1981	289	127	91	42	34	29	43.9	71.7	46.2	37.4	31.9
P	1982	3521	1553	1257	721	452	315	44.1	80.9	57.4	36	25.1
P	1983	1705	677	455	328	70	154	39.7	67.2	72.1	15.4	33.8
P	1984	13656	5933	4864	3105	1438	1276	43.4	82	63.8	29.6	26.2
P	1985	6568	2577	1768	1346	208	591	39.2	68.6	76.1	11.8	33.4
P	1986	39922	13675	10738	7176	2851	2702	34.3	78.5	66.8	26.6	25.2
P	1987	16747	5005	3339	2602	336	1123	29.9	66.7	77.9	10.1	33.6
P	1988	85856	21035	15971	10896	3832	4395	24.5	75.9	68.2	24	27.5
P	1989	28183	6261	4248	3452	322	1384	22.2	67.8	81.3	7.6	32.6
P	1990	112980	19259	14820	10860	3049	3561	17	77	73.3	20.6	24
P	1991	29391	4809	3268	2761	212	940	16.4	68	84.5	6.5	28.8
P	1992	122584	19563	15503	11422	3279	3903	16	79.2	73.7	21.2	25.2
P	1993	26160	3127	2102	1782	152	599	12	67.2	84.8	7.2	28.5
P	1994	108227	6904	5459	4175	985	1285	6.4	79.1	76.5	18	23.5
P	1995	26488	1402	993	860	57	260	5.3	70.8	86.6	5.7	26.2
P	1996	94965	2760	2064	1691	281	407	2.9	74.8	81.9	13.6	19.7
P	1997	32582	931	673	612	25	146	2.9	72.3	90.9	3.7	21.7
P	1998	130091	1242	989	887	51	151	1	79.6	89.7	5.2	15.3
P	1999	25938	213	163	148	1	34	0.8	76.5	90.8	0.6	20.9
P	2000	18738	79	77	71	1	3	0.4	97.5	92.2	1.3	3.9
P	2001	3401	15	10	10			0.4	66.7	100		
T	1980	77	30	25	17	6	8	39	83.3	68	24	32
T	1981	108	46	38	21	14	6	42.6	82.6	55.3	36.8	15.8
T	1982	787	322	255	137	90	48	40.9	79.2	53.7	35.3	18.8
T	1983	353	140	108	73	18	36	39.7	77.1	67.6	16.7	33.3
T	1984	2623	1084	882	507	292	265	41.3	81.4	57.5	33.1	30
T	1985	1538	637	457	343	70	148	41.4	71.7	75.1	15.3	32.4
T	1986	8723	3196	2575	1600	742	702	36.6	80.6	62.1	28.8	27.3
T	1987	4029	1492	1109	858	126	372	37	74.3	77.4	11.4	33.5
T	1988	24939	7366	5924	4086	1414	1504	29.5	80.4	69	23.9	25.4
T	1989	8045	2158	1566	1246	156	498	26.8	72.6	79.6	10	31.8
T	1990	30836	6496	5234	3923	1029	1180	21.1	80.6	75	19.7	22.5
T	1991	7690	1209	891	770	50	227	15.7	73.7	86.4	5.6	25.5
T	1992	35145	7296	5994	4288	1453	1405	20.8	82.2	71.5	24.2	23.4
T	1993	8837	1551	1154	999	91	296	17.6	74.4	86.6	7.9	25.6
T	1994	41125	2490	2053	1560	380	461	6.1	82.4	76	18.5	22.5
T	1995	10275	524	424	341	51	120	5.1	80.9	80.4	12	28.3
T	1996	46152	1006	825	653	126	187	2.2	82	79.2	15.3	22.7

Table 1C: Phase 1- 2001: Rates of inspection, failure, reinspection, and waiver by vehicle type and model year for individual vehicles

		number of vehicles						% of inspecte	% of failed	% of reinspected		
vehicle type	model year	inspected	failed	reinspected	passed reinspection	waivered	failed reinspection	failure rate	reinspection rate	reinspection pass rate	reinspection waiver rate	reinspection fail rate
T	1997	12065	221	189	163	13	47	1.8	85.5	86.2	6.9	24.9
T	1998	63921	507	447	406	23	51	0.8	88.2	90.8	5.1	11.4
T	1999	13008	59	44	41		3	0.5	74.6	93.2		6.8
T	2000	5336	25	23	22		1	0.5	92	95.7		4.3
T	2001	1154	5	4	3		1	0.4	80	75		25
H	1980			1								
H	1981	7	2	3		1		28.6	150		33.3	
H	1982	18	4	7	3	2	3	22.2	175	42.9	28.6	42.9
H	1983	12	5	4	2		3	41.7	80	50		75
H	1984	60	12	19	10	5	4	20	158.3	52.6	26.3	21.1
H	1985	43	11	13	5	5	6	25.6	118.2	38.5	38.5	46.2
H	1986	183	63	55	29	19	10	34.4	87.3	52.7	34.5	18.2
H	1987	74	22	16	12	1	5	29.7	72.7	75	6.3	31.3
H	1988	416	150	125	74	37	33	36.1	83.3	59.2	29.6	26.4
H	1989	153	53	34	26	6	9	34.6	64.2	76.5	17.6	26.5
H	1990	534	168	139	111	19	33	31.5	82.7	79.9	13.7	23.7
H	1991	130	38	33	28	1	5	29.2	86.8	84.8	3	15.2
H	1992	403	114	90	56	25	26	28.3	78.9	62.2	27.8	28.9
H	1993	120	50	32	22	5	12	41.7	64	68.8	15.6	37.5
H	1994	538	172	146	92	48	47	32	84.9	63	32.9	32.2
H	1995	217	74	61	52	10	17	34.1	82.4	85.2	16.4	27.9
H	1996	622	127	102	79	23	21	20.4	80.3	77.5	22.5	20.6
H	1997	241	34	20	16	2	8	14.1	58.8	80	10	40
H	1998	869	16	15	12	1	3	1.8	93.8	80	6.7	20
H	1999	336										
H	2000	174	2	2	2			1	100	100		
H	2001	23										

Table 1D: Phase 2 – 2001: Rates of inspection, failure, reinspection, and waiver by vehicle type and model year for individual vehicles (January 2001 to December 2001)

		number of vehicles						% of inspected	% of failed	% of reinspected		
vehicle	model	inspected	failed	reinspected	passed	waivered	failed	failure rate	reinspection rate	reinspection	reinspection	reinspection
type	year				reinspection		reinspection			pass rate	waiver rate	fail rate
P	1980	49	33	34	11	17	14	67.3	103	32.4	50	41.2
P	1981	51	22	14	8	4	3	43.1	63.6	57.1	28.6	21.4
P	1982	2456	1466	1247	469	719	221	59.7	85.1	37.6	57.7	17.7
P	1983	1006	522	348	223	72	135	51.9	66.7	64.1	20.7	38.8
P	1984	9910	5748	4985	2078	2673	1025	58	86.7	41.7	53.6	20.6
P	1985	3763	1937	1251	853	222	489	51.5	64.6	68.2	17.7	39.1
P	1986	23933	10360	8914	3999	4550	1868	43.3	86	44.9	51	21
P	1987	8145	2853	1836	1330	270	688	35	64.4	72.4	14.7	37.5
P	1988	47595	13282	11047	5367	5206	2304	27.9	83.2	48.6	47.1	20.9
P	1989	15110	3461	2234	1695	253	851	22.9	64.5	75.9	11.3	38.1
P	1990	62533	10444	8731	4813	3618	1641	16.7	83.6	55.1	41.4	18.8
P	1991	16126	2497	1641	1303	166	522	15.5	65.7	79.4	10.1	31.8
P	1992	68247	11275	9587	5450	3827	1968	16.5	85	56.8	39.9	20.5
P	1993	15040	1595	1053	829	132	329	10.6	66	78.7	12.5	31.2
P	1994	63268	3840	3254	2024	1126	594	6.1	84.7	62.2	34.6	18.3
P	1995	15705	682	467	396	42	131	4.3	68.5	84.8	9	28.1
P	1996	52198	1576	1284	939	287	203	3	81.5	73.1	22.4	15.8
P	1997	18499	553	382	341	13	114	3	69.1	89.3	3.4	29.8
P	1998	70937	625	466	401	35	72	0.9	74.6	86.1	7.5	15.5
P	1999	16050	174	104	97	4	27	1.1	59.8	93.3	3.8	26
P	2000	12474	45	29	24	1	6	0.4	64.4	82.8	3.4	20.7
P	2001	2035	6	4	4			0.3	66.7	100		
T	1980	60	38	34	19	9	13	63.3	89.5	55.9	26.5	38.2
T	1981	17	7	4	1		1	41.2	57.1	25		25
T	1982	1096	568	481	187	253	102	51.8	84.7	38.9	52.6	21.2
T	1983	385	211	148	100	19	61	54.8	70.1	67.6	12.8	41.2
T	1984	3977	2232	1952	789	1039	439	56.1	87.5	40.4	53.2	22.5
T	1985	1521	844	554	391	72	236	55.5	65.6	70.6	13	42.6
T	1986	10531	4862	4224	1758	2237	920	46.2	86.9	41.6	53	21.8
T	1987	3432	1475	1009	743	132	396	43	68.4	73.6	13.1	39.2
T	1988	23898	8330	7181	3510	3350	1505	34.9	86.2	48.9	46.7	21
T	1989	6395	1910	1312	1011	153	458	29.9	68.7	77.1	11.7	34.9
T	1990	26424	6227	5453	3150	2122	1013	23.6	87.6	57.8	38.9	18.6
T	1991	5846	1024	731	577	75	226	17.5	71.4	78.9	10.3	30.9
T	1992	28609	6344	5634	2947	2568	1108	22.2	88.8	52.3	45.6	19.7
T	1993	6660	1097	775	622	106	218	16.5	70.6	80.3	13.7	28.1
T	1994	32587	1791	1538	959	529	258	5.5	85.9	62.4	34.4	16.8
T	1995	7809	313	222	179	17	77	4	70.9	80.6	7.7	34.7
T	1996	32168	654	529	353	156	101	2	80.9	66.7	29.5	19.1

Table 1D: Phase 2 – 2001: Rates of inspection, failure, reinspection, and waiver by vehicle type and model year for individual vehicles (January 2001 to December 2001)

		number of vehicles						% of inspected	% of failed	% of reinspected		
vehicle type	model year	inspected	failed	reinspected	passed reinspection	waivered	failed reinspection	failure rate	reinspection rate	reinspection pass rate	reinspection waiver rate	reinspection fail rate
T	1997	8985	136	86	74	9	19	1.5	63.2	86	10.5	22.1
T	1998	47160	455	341	286	43	50	1	74.9	83.9	12.6	14.7
T	1999	10430	68	34	29		7	0.7	50	85.3		20.6
T	2000	4836	17	11	11		1	0.4	64.7	100		9.1
T	2001	919		1	1					100		
H	1980	2	1	1				50	100			
H	1981	1										
H	1982	28	13	11	5	4	1	46.4	84.6	45.5	36.4	9.1
H	1983	6	2	4	3			33.3	200	75		
H	1984	107	37	36	12	14	9	34.6	97.3	33.3	38.9	25
H	1985	31	13	10	5	3	3	41.9	76.9	50	30	30
H	1986	199	105	95	40	46	16	52.8	90.5	42.1	48.4	16.8
H	1987	70	28	20	14	3	9	40	71.4	70	15	45
H	1988	362	154	130	51	66	23	42.5	84.4	39.2	50.8	17.7
H	1989	117	33	24	12	8	7	28.2	72.7	50	33.3	29.2
H	1990	500	172	143	76	54	26	34.4	83.1	53.1	37.8	18.2
H	1991	76	25	18	12	1	7	32.9	72	66.7	5.6	38.9
H	1992	386	126	104	52	51	18	32.6	82.5	50	49	17.3
H	1993	78	25	23	19	1	7	32.1	92	82.6	4.3	30.4
H	1994	532	179	146	75	64	38	33.6	81.6	51.4	43.8	26
H	1995	165	52	41	29	10	17	31.5	78.8	70.7	24.4	41.5
H	1996	620	142	111	73	37	27	22.9	78.2	65.8	33.3	24.3
H	1997	206	25	17	12	2	7	12.1	68	70.6	11.8	41.2
H	1998	751	12	6	3	3	2	1.6	50	50	50	33.3
H	1999	280	7	3	1	1	1	2.5	42.9	33.3	33.3	33.3
H	2000	144										
H	2001	18										

Table 2A: Phase 1 - Modal Failure rates (January 1999 to December 1999; mandatory testing started April 1999)

vehicle	model	number	number	number of intial inspections			failure rate as %	HC fail rate as %	CO fail rate as %	NO fail rate as %
type	year	of initial	of failed	which include	which include	which include	of	of failed	of failed	of failed
		inspections	initial inspections	HC failure	CO failure	NO failure	initial inspections	initial inspections	initial inspections	initial inspections
P	1980	2436	1245	806	751	579	51.1	64.7	60.3	46.5
P	1981	1501	729	482	445	326	48.6	66.1	61	44.7
P	1982	5673	2865	1908	1761	1264	50.5	66.6	61.5	44.1
P	1983	2551	1224	806	703	563	48	65.8	57.4	46
P	1984	23356	11844	6847	5974	7074	50.7	57.8	50.4	59.7
P	1985	10364	4684	2742	2562	2559	45.2	58.5	54.7	54.6
P	1986	64525	26339	15847	14315	13796	40.8	60.2	54.3	52.4
P	1987	24078	8175	5142	4762	3606	34	62.9	58.3	44.1
P	1988	112517	29357	23226	15788	14358	26.1	79.1	53.8	48.9
P	1989	33889	7305	5565	4017	3814	21.6	76.2	55	52.2
P	1990	118969	19484	13039	10222	12295	16.4	66.9	52.5	63.1
P	1991	30004	4413	3032	2434	2901	14.7	68.7	55.2	65.7
P	1992	115159	15936	7535	5571	12919	13.8	47.3	35	81.1
P	1993	26237	2561	1469	995	1862	9.8	57.4	38.9	72.7
P	1994	98829	4465	2177	2006	2983	4.5	48.8	44.9	66.8
P	1995	30436	832	445	456	496	2.7	53.5	54.8	59.6
P	1996	91955	1360	621	1035	767	1.5	45.7	76.1	56.4
P	1997	35184	519	224	441	206	1.5	43.2	85	39.7
P	1998	20406	130	43	81	72	0.6	33.1	62.3	55.4
P	1999	11610	62	8	36	62	0.5	12.9	58.1	100
T	1980	529	233	140	140	86	44	60.1	60.1	36.9
T	1981	282	100	72	49	46	35.5	72	49	46
T	1982	802	335	207	167	150	41.8	61.8	49.9	44.8
T	1983	270	119	80	74	43	44.1	67.2	62.2	36.1
T	1984	2942	1369	939	874	628	46.5	68.6	63.8	45.9
T	1985	1495	710	487	475	303	47.5	68.6	66.9	42.7
T	1986	9378	3895	2835	2170	1842	41.5	72.8	55.7	47.3
T	1987	3833	1503	1238	677	717	39.2	82.4	45	47.7
T	1988	21449	6649	5614	3263	2827	31	84.4	49.1	42.5
T	1989	6678	1772	1479	892	742	26.5	83.5	50.3	41.9
T	1990	22045	4524	3853	1843	1830	20.5	85.2	40.7	40.5
T	1991	5457	701	558	318	277	12.8	79.6	45.4	39.5
T	1992	21616	4293	3769	2156	2348	19.9	87.8	50.2	54.7
T	1993	6172	857	751	469	408	13.9	87.6	54.7	47.6
T	1994	24588	1217	937	614	499	4.9	77	50.5	41
T	1995	8654	301	239	178	145	3.5	79.4	59.1	48.2
T	1996	29810	384	229	233	243	1.3	59.6	60.7	63.3
T	1997	10980	73	36	45	38	0.7	49.3	61.6	52.1
T	1998	4644	36	5	8	19	0.8	13.9	22.2	52.8
T	1999	3146	12	7	5	1	0.4	58.3	41.7	8.3

Table 2A: Phase 1 - Modal Failure rates (January 1999 to December 1999; mandatory testing started April 1999)

vehicle type	model year	number of initial inspections	number of failed initial inspections	number of intial inspections which include HC failure	which include CO failure	which include NO failure	failure rate as % of initial inspections	HC fail rate as % of failed initial inspections	CO fail rate as % of failed initial inspections	NO fail rate as % of failed initial inspections
H	1980	16	3	2	3	1	18.8	66.7	100	33.3
H	1981	8								
H	1982	26	8	3	6	1	30.8	37.5	75	12.5
H	1983	6								
H	1984	87	26	15	18	7	29.9	57.7	69.2	26.9
H	1985	39	15	9	10	5	38.5	60	66.7	33.3
H	1986	227	82	56	52	22	36.1	68.3	63.4	26.8
H	1987	105	48	46	27	13	45.7	95.8	56.3	27.1
H	1988	476	167	152	123	35	35.1	91	73.7	21
H	1989	236	87	81	58	14	36.9	93.1	66.7	16.1
H	1990	598	163	164	92	29	27.3	100.6	56.4	17.8
H	1991	134	43	40	26	10	32.1	93	60.5	23.3
H	1992	376	112	87	80	55	29.8	77.7	71.4	49.1
H	1993	118	32	30	22	14	27.1	93.8	68.8	43.8
H	1994	530	163	98	73	122	30.8	60.1	44.8	74.8
H	1995	235	58	39	26	40	24.7	67.2	44.8	69
H	1996	547	121	62	45	102	22.1	51.2	37.2	84.3
H	1997	148	9	6	6	6	6.1	66.7	66.7	66.7
H	1998	101								
H	1999	45								

Table 2B: Phase 1 - Modal Failure rates (January 2000 to December 2000)

vehicle	model	number	number	number of intial inspections			failure rate as %	HC fail rate as %	CO fail rate as %	NO fail rate as %
type	year	of initial	of failed	which include	which include	which include	of	of failed	of failed	of failed
		inspections	initial inspections	HC failure	CO failure	NO failure	initial inspections	initial inspections	initial inspections	initial inspections
P	1980	370	190	133	136	77	51.4	70	71.6	40.5
P	1981	5683	2739	1740	1608	1272	48.2	63.5	58.7	46.4
P	1982	1676	758	494	472	305	45.2	65.2	62.3	40.2
P	1983	9572	4376	2654	2502	2122	45.7	60.6	57.2	48.5
P	1984	7106	3276	1936	1666	1822	46.1	59.1	50.9	55.6
P	1985	35274	15523	8834	7906	9025	44	56.9	50.9	58.1
P	1986	19703	7204	4337	4235	3392	36.6	60.2	58.8	47.1
P	1987	82165	26810	16705	14726	12428	32.6	62.3	54.9	46.4
P	1988	37347	10096	8045	5698	4444	27	79.7	56.4	44
P	1989	127350	25343	18424	12824	13352	19.9	72.7	50.6	52.7
P	1990	40899	7416	5190	4206	4383	18.1	70	56.7	59.1
P	1991	128511	18223	11488	8926	12423	14.2	63	49	68.2
P	1992	39018	6368	3046	2410	5039	16.3	47.8	37.8	79.1
P	1993	123439	12389	5983	4029	9938	10	48.3	32.5	80.2
P	1994	31797	2239	1251	1142	1558	7	55.9	51	69.6
P	1995	125960	3918	1955	1990	2366	3.1	49.9	50.8	60.4
P	1996	32367	903	475	663	447	2.8	52.6	73.4	49.5
P	1997	136256	2535	1245	2046	1111	1.9	49.1	80.7	43.8
P	1998	35733	281	135	239	198	0.8	48	85.1	70.5
P	1999	20706	204	49	69	179	1	24	33.8	87.7
P	2000	9713	34	21	25	25	0.4	61.8	73.5	73.5
T	1980	156	77	54	51	25	49.4	70.1	66.2	32.5
T	1981	1356	526	332	297	189	38.8	63.1	56.5	35.9
T	1982	379	166	97	99	57	43.8	58.4	59.6	34.3
T	1983	1404	556	351	326	202	39.6	63.1	58.6	36.3
T	1984	1245	568	375	366	206	45.6	66	64.4	36.3
T	1985	6862	3071	2023	1883	1406	44.8	65.9	61.3	45.8
T	1986	4171	1599	1155	892	644	38.3	72.2	55.8	40.3
T	1987	18751	7237	5565	3072	3247	38.6	76.9	42.4	44.9
T	1988	9536	2933	2381	1542	1188	30.8	81.2	52.6	40.5
T	1989	34954	9131	7256	4351	3701	26.1	79.5	47.7	40.5
T	1990	10327	2088	1674	980	838	20.2	80.2	46.9	40.1
T	1991	32474	4630	3571	1962	1848	14.3	77.1	42.4	39.9
T	1992	10590	2013	1613	1028	1002	19	80.1	51.1	49.8
T	1993	40411	6216	5209	3171	3104	15.4	83.8	51	49.9
T	1994	11130	633	523	384	267	5.7	82.6	60.7	42.2
T	1995	47528	1573	1294	988	771	3.3	82.3	62.8	49
T	1996	14109	271	184	179	190	1.9	67.9	66.1	70.1
T	1997	51347	527	450	536	427	1	85.4	101.7	81
T	1998	20137	131	78	85	120	0.7	59.5	64.9	91.6
T	1999	5381	27	24	25	16	0.5	88.9	92.6	59.3
T	2000	3748	11	11	7	4	0.3	100	63.6	36.4

Table 2B: Phase 1 - Modal Failure rates (January 2000 to December 2000)

vehicle type	model year	number of initial inspections	number of failed initial inspections	number of intial inspections which include HC failure	which include CO failure	which include NO failure	failure rate as % of initial inspections	HC fail rate as % of failed Initial inspections	CO fail rate as % of failed initial inspections	NO fail rate as % of failed initial inspections
H	1980	5	3	1	3		60	33.3	100	0
H	1981	29	8	4	4	4	27.6	50	50	50
H	1982	10	3	3	2	1	30	100	66.7	33.3
H	1983	48	17	6	11	4	35.4	35.3	64.7	23.5
H	1984	35	7	3	5	2	20	42.9	71.4	28.6
H	1985	144	60	34	36	19	41.7	56.7	60	31.7
H	1986	83	39	23	23	7	47	59	59	17.9
H	1987	369	137	119	66	29	37.1	86.9	48.2	21.2
H	1988	172	58	54	42	14	33.7	93.1	72.4	24.1
H	1989	639	196	176	117	36	30.7	89.8	59.7	18.4
H	1990	239	61	57	37	9	25.5	93.4	60.7	14.8
H	1991	466	129	108	73	25	27.7	83.7	56.6	19.4
H	1992	168	37	29	27	21	22	78.4	73	56.8
H	1993	473	131	101	83	71	27.7	77.1	63.4	54.2
H	1994	201	56	31	25	48	27.9	55.4	44.6	85.7
H	1995	917	245	157	109	174	26.7	64.1	44.5	71
H	1996	291	73	39	32	61	25.1	53.4	43.8	83.6
H	1997	969	90	38	41	78	9.3	42.2	45.6	86.7
H	1998	206	4	1	1	3	1.9	25	25	75
H	1999	148			1					
H	2000	43								

Table 2C: Phase 1 - Modal Failure rates (January 2001 to December 2001)

vehicle	model	number	number	number of intial inspections			failure rate as %	HC fail rate as %	CO fail rate as %	NO fail rate as %
type	year	of initial	of failed	which include	which include	which include	of	of failed	of failed	of failed
		inspections	initial inspections	HC failure	CO failure	NO failure	initial inspections	initial inspections	initial inspections	initial inspections
P	1980	100	39	32	37	11	39	82.1	94.9	28.2
P	1981	327	137	102	93	53	41.9	74.5	67.9	38.7
P	1982	4005	1703	1183	1051	720	42.5	69.5	61.7	42.3
P	1983	2029	795	556	491	358	39.2	69.9	61.8	45
P	1984	16012	6631	3928	3167	4176	41.4	59.2	47.8	63
P	1985	7774	2919	1838	1576	1636	37.5	63	54	56
P	1986	46378	15470	10052	8507	7981	33.4	65	55	51.6
P	1987	19636	5765	4109	3597	2466	29.4	71.3	62.4	42.8
P	1988	98107	23975	22098	12836	11320	24.4	92.2	53.5	47.2
P	1989	32237	7123	6392	4034	3661	22.1	89.7	56.6	51.4
P	1990	126645	22001	16673	11808	14870	17.4	75.8	53.7	67.6
P	1991	33063	5606	4408	3101	3918	17	78.6	55.3	69.9
P	1992	136662	22669	12113	7884	20379	16.6	53.4	34.8	89.9
P	1993	28945	3617	2570	1374	3060	12.5	71.1	38	84.6
P	1994	116704	7989	5321	3610	6315	6.8	66.6	45.2	79
P	1995	28882	1763	1377	1020	1203	6.1	78.1	57.9	68.2
P	1996	101332	3102	2227	2106	1793	3.1	71.8	67.9	57.8
P	1997	34944	1033	671	866	484	3	65	83.8	46.9
P	1998	141053	1369	906	1001	1066	1	66.2	73.1	77.9
P	1999	27390	257	131	137	257	0.9	51	53.3	100
P	2000	19937	86	69	82	82	0.4	80.2	95.3	95.3
P	2001	3521	34	14	13	34	0.5	41.2	38.2	100
T	1980	91	34	19	24	12	37.4	55.9	70.6	35.3
T	1981	121	50	33	26	20	41.3	66	52	40
T	1982	902	347	241	186	131	38.5	69.5	53.6	37.8
T	1983	410	156	114	92	52	38	73.1	59	33.3
T	1984	3030	1201	860	729	502	39.6	71.6	60.7	41.8
T	1985	1787	713	503	454	298	39.9	70.5	63.7	41.8
T	1986	10082	3534	2694	1811	1544	35.1	76.2	51.2	43.7
T	1987	4725	1676	1469	777	680	35.5	87.6	46.4	40.6
T	1988	28530	8204	7995	4102	3488	28.8	97.5	50	42.5
T	1989	9255	2467	2467	1232	994	26.2	100	49.9	40.3
T	1990	34436	7701	7701	3022	3373	20.8	100	39.2	43.8
T	1991	8484	1414	1414	616	617	15.6	100	43.6	43.6
T	1992	39333	8257	8251	4089	4501	21	99.9	49.5	54.5
T	1993	9953	1909	1909	937	828	17.5	100	49.1	43.4
T	1994	43965	2824	2824	1596	1379	6.3	100	56.5	48.8
T	1995	11036	592	595	393	291	5.4	100.5	66.4	49.2
T	1996	49092	1122	781	747	954	2.3	69.6	66.6	85
T	1997	12901	280	280	291	213	2	100	103.9	76.1
T	1998	68782	730	411	440	730	0.8	56.3	60.3	100

Table 2C: Phase 1 - Modal Failure rates (January 2001 to December 2001)

T	1999	13596	68	68	81	43	0.4	100	119.1	63.2
T	2000	5632	35	35	33	17	0.5	100	94.3	48.6
T	2001	1218	10	5	10	8	0.4	50	100	80
H	1980									
H	1981	8	3	1	1	2	37.5	33.3	33.3	66.7
H	1982	20	4		2	2	20	0	50	50
H	1983	15	7	1	6		46.7	14 3	85.7	0
H	1984	67	14	11	12	2	20.9	78.6	85.7	14.3
H	1985	48	13	8	14	1	27.1	61.5	107.7	7.7
H	1986	205	68	44	49	16	33.2	64.7	72.1	23.5
H	1987	85	24	26	13	8	28 2	108.3	54 2	33.3
H	1988	478	168	164	103	39	35.1	97.6	61.3	23.2
H	1989	179	62	78	41	10	34.6	125.8	66.1	16.1
H	1990	610	187	229	114	34	30.7	122.5	61	18.2
H	1991	155	41	49	26	15	26.5	119.5	63.4	36.6
H	1992	467	130	139	83	85	27.8	106.9	63.8	65.4
H	1993	144	56	54	39	41	38.9	96.4	69.6	73 2
H	1994	649	202	186	115	168	31.1	92.1	56.9	83.2
H	1995	255	92	84	49	72	36.1	91.3	53.3	78.3
H	1996	712	152	140	84	124	21.3	92.1	55.3	81.6
H	1997	285	39	21	21	36	13.7	53.8	53.8	92.3
H	1998	940	16	19	13	22	1.7	118.8	81.3	137.5
H	1999	353		1						
H	2000	192	2	2	1		1	100	50	0
H	2001	26								

Table 2D: Phase 2 - Modal Failure rates (January 2001 to December 2001)

vehicle	model	number	number	number of intial inspections			failure rate as %	HC fail rate as %	CO fail rate as %	NO fail rate as %
type	year	of initial	of failed	which include	which include	which include	of	of failed	of failed	of failed
		inspections	initial inspections	HC failure	CO failure	NO failure	initial inspections	initial inspections	initial inspections	initial inspections
P	1980	76	45	34	33	16	59.2	75.6	73.3	35.6
P	1981	57	24	16	14	14	42.1	66.7	58.3	58.3
P	1982	2801	1609	1182	994	699	57.4	73.5	61.8	43.4
P	1983	1260	651	472	391	285	51.7	72.5	60.1	43.8
P	1984	11601	6381	3872	3017	3994	55	60.7	47.3	62.6
P	1985	4614	2279	1486	1218	1252	49.4	65.2	53.4	54.9
P	1986	27541	11621	8263	6318	5734	42.2	71.1	54.4	49.3
P	1987	9553	3391	2466	1837	1499	35.5	72.7	54.2	44.2
P	1988	53387	15032	13775	7361	7436	28.2	91.6	49	49.5
P	1989	17219	4125	3636	1979	2125	24	88.1	48	51.5
P	1990	68453	11759	9194	5916	7832	17.2	78.2	50.3	66.6
P	1991	17769	2936	2301	1489	2086	16.5	78.4	50.7	71
P	1992	74690	12884	6274	4226	11747	17.2	48.7	32.8	91.2
P	1993	16290	1858	1126	614	1686	11.4	60.6	33	90.7
P	1994	67569	4353	2405	1868	3651	6.4	55.2	42.9	83.9
P	1995	16849	859	566	491	573	5.1	65.9	57.2	66.7
P	1996	55578	1751	1088	1330	898	3.2	62.1	76	51.3
P	1997	19605	640	367	567	218	3.3	57.3	88.6	34.1
P	1998	76596	692	390	527	465	0.9	56.4	76.2	67.2
P	1999	16861	215	71	54	215	1.2	33	25.1	100
P	2000	13169	56	47	41	56	0.4	83.9	73.2	100
P	2001	2089	12	7	9	12	0.3	58.3	75	100
T	1980	87	45	34	36	20	51.7	75.6	80	44.4
T	1981	19	8	4	4	3	42.1	50	50	37.5
T	1982	1235	615	442	321	218	49.8	71.9	52.2	35.4
T	1983	486	257	193	153	97	52.9	75.1	59.5	37.7
T	1984	4546	2447	1788	1598	923	53.8	73.1	65.3	37.7
T	1985	1878	998	743	630	390	53.1	74.4	63.1	39.1
T	1986	12111	5451	4225	2808	2252	45	77.5	51.5	41.3
T	1987	4136	1745	1534	778	724	42.2	87.9	44.6	41.5
T	1988	26838	9193	8858	4137	3955	34.3	96.4	45	43
T	1989	7345	2214	2191	1111	901	30.1	99	50.2	40.7
T	1990	29104	7361	7361	2835	3064	23.5	100	38.5	41.6
T	1991	6493	1270	1270	520	493	17.9	100	40.9	38.8
T	1992	31389	7416	7416	3643	3482	22.6	100	49.1	47
T	1993	7310	1247	1386	709	596	17.1	111.1	56.9	47.8
T	1994	34505	2018	1921	1158	1076	5.8	95.2	57.4	53.3
T	1995	8269	362	350	243	182	4.4	96.7	67.1	50.3
T	1996	33931	726	508	497	610	2.1	70	68.5	84
T	1997	9462	160	152	160	126	1.6	95	100	78.8
T	1998	50406	542	290	320	542	1	53.5	59	100

Table 2D: Phase 2 - Modal Failure rates (January 2001 to December 2001)

vehicle	model	number	number	number of intial inspections			failure rate as %	HC fail rate as %	CO fail rate as %	NO fail rate as %
type	year	of initial	of failed	which include	which include	which include	of	of failed	of failed	of failed
		inspections	initial inspections	HC failure	CO failure	NO failure	initial inspections	initial inspections	initial inspections	initial inspections
T	1999	10889	72	65	69	55	0.7	90.3	95.8	76.4
T	2000	5086	25	25	22	9	0.3	100	88	36
T	2001	941		3	4	5				
H	1980	2	1		1		50	0	100	0
H	1981	1								
H	1982	32	14	5	10	2	43.8	35.7	71.4	14.3
H	1983	7	2	1	2		28.6	50	100	0
H	1984	125	41	25	31	6	32.8	61	75.6	14.6
H	1985	38	16	11	10	5	42.1	68.8	62.5	31.3
H	1986	222	109	67	59	31	49.1	61.5	54.1	28.4
H	1987	75	31	27	13	12	41.3	87.1	41.9	38.7
H	1988	414	168	163	118	31	40.6	97	70.2	18.5
H	1989	131	46	46	27	12	27.5	100	58.7	26.1
H	1990	560	193	192	115	46	34.5	99.5	59.6	23.8
H	1991	90	28	26	18	8	31.1	92.9	64.3	28.6
H	1992	445	152	139	107	97	34.2	91.4	70.4	63.8
H	1993	93	30	30	16	17	30.1	100	53.3	56.7
H	1994	644	212	177	116	165	32.9	83.5	54.7	77.8
H	1995	211	69	56	37	66	32.7	81.2	53.6	95.7
H	1996	710	172	110	89	137	24.2	64	51.7	79.7
H	1997	238	32	21	12	32	13.4	65.6	37.5	100
H	1998	823	17	17	12	11	1.9	100	70.6	64.7
H	1999	304	11	9	5	10	3.6	81.8	45.5	90.9
H	2000	152		2						
H	2001	18								

Table 3A: 1999 - Phase 1: Calculation of emission reductions by vehicle type and by age group

vehicle type	model years	HC result	CO result	NO result	number in fleet with initial condition	number not changing	number achieving bad final result	number achieving good final result	INITIAL RESULT g/km			FINAL BAD REPAIR g/km			FINAL GOOD REPAIR g/km			ANNUAL km	row total INITIAL H505 Mg			row total FINAL H505 Mg			row total REDUCTION H505Mg			row total % REDUCTION		
									HC	CO	NO	HC	CO	NO	HC	CO	NO		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
P&T	pre-80				99000				1.25	15.63	1.94							7000	866	10828	1343	866	10828	1343						
P	1980-87	F	F	F	11868	7228	2012	2618	2.35	34.28	3.15	2.00	25.18	2.55	0.97	12.31	1.50	12000	334	4879	449	282	3968	382	52	910	67	15.4	18.7	14.9
P	1980-87	F	F	P	44730	28301	6641	9788	2.35	34.28	1.07	2.00	25.18	1.07	0.97	12.31	1.50	12000	1259	18402	573	1070	15095	623	189	3307	-50	15.0	18.0	-8.8
P	1980-87	F	P	F	13011	7896	2213	2902	2.35	11.98	3.15	2.00	11.98	2.55	0.97	12.31	1.50	12000	366	1870	493	309	1881	419	57	-12	74	15.6	-0.6	15.0
P	1980-87	F	P	P	12542	8064	1632	2846	2.35	11.98	1.07	2.00	11.98	1.07	0.97	12.31	1.50	12000	353	1802	161	299	1814	175	54	11	-15	15.2	-0.6	-9.1
P	1980-87	P	F	F	4196	2528	599	1069	1.46	34.28	3.15	1.46	25.18	2.55	0.97	12.31	1.50	12000	73	1726	159	67	1379	133	6	347	26	8.6	20.1	16.2
P	1980-87	P	F	P	13747	8834	1483	3430	1.46	34.28	1.07	1.46	25.18	1.07	0.97	12.31	1.50	12000	241	5655	176	221	4589	194	20	1067	-18	8.3	18.9	-10.0
P	1980-87	P	P	F	38692	23463	7909	7320	1.46	11.98	3.15	1.46	11.98	2.55	0.97	12.31	1.50	12000	677	5560	1465	635	5589	1261	43	-29	204	6.3	-0.5	13.9
P	1980-87	P	P	P	192132	192132			0.57	9.19	1.27							12000	1303	21181	2936	1303	21181	2936						
P	1988-93	F	F	F	27753	15914	3958	7881	0.89	24.21	1.48	0.60	14.61	0.95	0.29	4.49	0.79	17000	460	11424	697	347	8136	569	118	3288	128	25.6	28.8	18.4
P	1988-93	F	F	P	40208	23065	4509	12634	0.89	24.21	0.64	0.60	14.61	0.64	0.29	4.49	0.79	17000	677	16588	437	497	11602	469	180	4986	-32	26.6	30.1	-7.2
P	1988-93	F	P	F	19179	10685	3140	5354	0.89	6.52	1.48	0.60	6.52	0.95	0.29	4.49	0.79	17000	322	2126	482	238	1942	391	84	184	91	26.1	8.7	18.9
P	1988-93	F	P	P	20371	11142	3128	6101	0.89	6.52	0.64	0.60	6.52	0.64	0.29	4.49	0.79	17000	342	2258	221	249	2048	236	93	210	-15	27.1	9.3	6.9
P	1988-93	P	F	F	3419	1867	534	1018	0.46	24.21	1.48	0.46	14.61	0.95	0.29	4.49	0.79	17000	27	1406	86	24	979	69	3	426	17	10.8	30.4	19.8
P	1988-93	P	F	P	5628	3187	566	1875	0.46	24.21	0.64	0.46	14.61	0.64	0.29	4.49	0.79	17000	44	2317	81	39	1596	86	5	721	-5	12.2	31.1	-7.7
P	1988-93	P	P	F	43814	23886	8907	11021	0.46	6.52	1.48	0.46	6.52	0.95	0.29	4.49	0.79	17000	344	4857	1100	312	4478	891	32	380	209	9.2	7.8	19.0
P	1988-93	P	P	P	802454	802454			0.17	2.64	0.38							17000	2267	35991	5121	2267	35991	5121						
P	1994-2000	F	F	F	1551	826	191	534	0.50	7.05	1.34	0.50	3.87	1.19	0.13	2.50	0.23	22000	17	241	46	13	174	32	4	67	14	25.1	27.8	29.9
P	1994-2000	F	F	P	2600	1635	151	815	0.50	7.05	0.15	0.50	3.87	0.15	0.13	2.50	0.23	22000	29	404	8	21	301	10	7	102	-2	25.7	25.3	17.6
P	1994-2000	F	P	F	984	568	139	277	0.50	2.81	1.34	0.50	2.81	1.19	0.13	2.50	0.23	22000	11	61	29	9	59	22	2	2	7	20.5	3.1	24.8
P	1994-2000	F	P	P	1485	795	120	570	0.50	2.81	0.15	0.50	2.81	0.15	0.13	2.50	0.23	22000	18	92	5	12	88	6	5	4	1	28.0	4.3	19.5
P	1994-2000	P	F	F	382	198	39	125	0.32	7.05	1.34	0.32	3.87	1.19	0.13	2.50	0.23	22000	3	56	11	2	41	7	1	15	3	20.1	27.1	29.8
P	1994-2000	P	F	P	1927	1100	146	681	0.32	7.05	0.15	0.32	3.87	0.15	0.13	2.50	0.23	22000	14	280	8	11	221	8	3	78	-1	20.0	28.2	18.0
P	1994-2000	P	P	F	5132	2794	1017	1321	0.32	2.81	1.34	0.32	2.81	1.19	0.13	2.50	0.23	22000	37	318	151	31	309	116	5	9	35	15.0	2.9	23.4
P	1994-2000	P	P	P	735904	735904			0.13	1.82	0.23							22000	2105	29368	3724	2105	29368	3724						
T	1980-87	F	F	F	1705	1125	259	321	2.35	34.28	3.15	2.00	25.18	2.55	0.97	12.31	1.50	12000	48	701	65	42	588	56	6	113	9	13.3	16.1	12.8
T	1980-87	F	F	P	6996	4429	1116	1451	2.35	34.28	1.07	2.00	25.18	1.07	0.97	12.31	1.50	12000	197	2878	80	168	2374	87	28	505	-7	14.5	17.5	-8.7
T	1980-87	F	P	F	2967	2023	386	558	2.35	11.98	3.15	2.00	11.98	2.55	0.97	12.31	1.50	12000	84	429	113	73	431	99	11	2	14	13.1	0.5	12.6
T	1980-87	F	P	P	3388	2283	351	744	2.35	11.98	1.07	2.00	11.98	1.07	0.97	12.31	1.50	12000	95	487	43	82	490	47	14	3	-4	14.4	-0.6	-8.8
T	1980-87	P	F	F	654	411	99	144	1.46	34.28	3.15	1.46	25.18	2.55	0.97	12.31	1.50	12000	11	269	25	11	220	21	1	49	4	7.3	18.1	14.5
T	1980-87	P	F	P	2003	1144	314	545	1.46	34.28	1.07	1.46	25.18	1.07	0.97	12.31	1.50	12000	35	824	26	32	646	28	3	178	3	9.1	21.6	10.9
T	1980-87	P	P	F	4262	2870	765	627	1.46	11.98	3.15	1.46	11.98	2.55	0.97	12.31	1.50	12000	75	612	161	70	616	139	6	3	22	6.5	-0.5	13.7
T	1980-87	P	P	P	26154	26154			0.57	9.19	1.27							12000	177	2883	400	177	2883	400						
T	1988-93	F	F	F	4288	2297	721	1270	1.92	28.24	1.91	1.80	20.19	1.80	0.46	8.77	0.92	17000	140	1913	140	107	1461	117	33	451	23	23.6	23.6	16.4
T	1988-93	F	F	P	12439	7105	1437	3897	1.92	28.24	0.54	1.80	20.19	0.54	0.46	8.77	0.92	17000	407	5549	115	307	4244	140	100	1305	25	24.6	23.5	-21.9
T	1988-93	F	P	F	4833	2509	835	1489	1.92	10.24	1.91	1.80	10.24	1.80	0.46	8.77	0.92	17000	158	842	157	119	804	131	39	37	27	24.5	4.4	17.0
T	1988-93	F	P	P	10126	5435	1201	3490	1.92	10.24	0.54	1.80	10.24	0.54	0.46	8.77	0.92	17000	331	1763	93	242	1676	116	89	87	-23	26.8	5.0	24.1
T	1988-93	P	F	F	741	440	99	202	1.01	28.24	1.91	1.01	20.19	1.80	0.46	8.77	0.92	17000	13	330	24	11	260	21	2	70	4	14.7	21.2	14.9
T	1988-93	P	F	P	1051	522	137	392	1.01	28.24	0.54	1.01	20.19	0.54	0.46	8.77	0.92	17000	18	469	10	14	338	12	4	131	3	20.1	27.8	-20.1
T	1988-93	P	P	F	6453	3534	1303	1616	1.01	10.24	1.91	1.01	10.24	1.80	0.46	8.77	0.92	17000	110	1124	210	95	1083	180	15	40	30	13.5	3.6	14.2
T	1988-93	P	P	P	149116	149116			0.46	6.08	0.92							17000	1166	15404	2332	1166	15404	2332						
T	1994-2000	F	F	F	798	458	85	255	0.50	7.05	1.40	0.50	3.87	1.19	0.18	3.41	0.50	22000	9	124	25	7	97	19	2	27	6	21.0	21.4	22.4
T	1994-2000	F	F	P	1200	677	92	431	0.50	7.05	0.24	0.50	3.87	0.15	0.18	3.41	0.50	22000	13	186	6	10	145	9	3	41	2	23.3	22.0	34.5
T	1994-2000	F	P	F	243	146	22	75	0.50	2.81	1.40	0.50	2.81	1.19	0.18	3.41	0.50	22000	3	15	7	2	16	6	1	1	2	20.0	-6.6	21.2
T	1994-2000	F	P	P	936	506	92	337	0.50	2.81	0.24	0.50	2.81	0.15	0.18	3.41	0.50	22000	10	58	5	8	62	7	2	4	-2	23.4	7.7	-33.8
T	1994-2000	P	F	F	125	70	16	39	0.32	7.05	1.40	0.32	3.87	1.19	0.18	3.41	0.50	22000	1	19	4	1	15	3	0	4	1	14.0	21.9	22.1
T	1994-2000	P	F	P	196	116	13	67	0.32	7.05	0.24	0.32	3.87	0.15	0.18	3.41	0.50	22000	1	30	1	1	24	1	0	6	0	15.3	20.6	-32.8
T	1994-2000	P	P	F	1053	550	150	353	0.32	2.81	1.40	0.32	2.81	1.19	0.18	3.41	0.50	22000	7	65	32	6	70	25	1	5	8	15.0	7.1	23.7
T	1994-2000	P	P	P	218056	218056			0.18	3.41	0.50							22000	629	16123	2347	629	16123	2347						
																		TOTAL	16132	232831	26369	14810	213748	25555	1322	19082	814	8.2	8.2	3.1

able 3B: 2000 - Phase 1: Calculation of emission reductions by vehicle type and by age group

vehicle type	model years	HC result	CO result	number in fleet with initial condition	number net changing	number achieving bad final result	number achieving good final result	INITIAL RESULT g/km			FINAL BAD REPAIR g/km			FINAL GOOD REPAIR g/km			ANNUAL km	row total INITIAL H505 Mg			row total FINAL H505 Mg			row total REDUCTION H505Mg			row total % REDUCTION		
								HC	CO	NO	HC	CO	NO	HC	CO	NO		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
P&T	pre-80			94050				1.25	15.63	1.94							7000	823	10287	1276	823	10287	1276						
P	1980-87	F	F	7641	3153	1997	2491	2.35	34.28	3.15	2.00	25.18	2.55	0.97	12.31	1.50	12000	215	3144	289	166	2268	225	49	875	64	22.9	27.8	22.2
P	1980-87	F	F	30880	13103	7414	10363	2.35	34.28	1.07	2.00	25.18	1.07	0.97	12.31	1.50	12000	869	12704	395	668	9161	449	202	3543	-53	23.2	27.9	-13.5
P	1980-87	F	P	8454	3304	2226	2922	2.35	11.98	3.15	2.00	11.98	2.55	0.97	12.31	1.50	12000	238	1215	320	181	1228	246	57	-12	74	24.1	-1.0	23.3
P	1980-87	F	P	8100	3082	1855	3163	2.35	11.98	1.07	2.00	11.98	1.07	0.97	12.31	1.50	12000	228	1164	104	168	1177	120	60	13	-16	28.2	-1.1	15.7
P	1980-87	P	F	2871	1404	488	981	1.46	34.28	3.15	1.46	25.18	2.55	0.97	12.31	1.50	12000	50	1181	109	45	869	88	8	312	23	11.4	28.4	21.2
P	1980-87	P	F	9028	3715	1503	3810	1.46	34.28	1.07	1.46	25.18	1.07	0.97	12.31	1.50	12000	158	3714	116	136	2545	135	22	1169	-20	14.1	31.5	-17.0
P	1980-87	P	P	26869	10855	7649	8365	1.46	11.98	3.15	1.46	11.98	2.55	0.97	12.31	1.50	12000	470	3881	1017	422	3894	795	49	-33	222	10.4	-0.9	21.9
P	1980-87	P	P	143077	143077			0.57	9.19	1.27							12000	970	15773	2186	970	15773	2186						
P	1988-93	F	F	24659	13162	3401	8096	0.99	24.21	1.48	0.60	14.61	0.95	0.29	4.49	0.79	17000	414	10151	619	296	6881	494	118	3269	125	28.5	32.2	20.3
P	1988-93	F	F	36590	21789	3778	13012	0.99	24.21	0.64	0.60	14.61	0.64	0.29	4.49	0.79	17000	648	15885	419	469	10906	451	179	4979	-33	27.8	31.3	-7.8
P	1988-93	F	P	15198	7750	2560	4888	0.99	6.52	1.48	0.60	6.52	0.95	0.29	4.49	0.79	17000	255	1685	382	181	1516	301	75	168	80	29.3	10.0	21.0
P	1988-93	F	P	19730	10565	3061	6104	0.99	6.52	0.64	0.60	6.52	0.64	0.29	4.49	0.79	17000	331	2187	214	239	1977	229	92	210	-15	27.9	9.6	-7.1
P	1988-93	P	F	3434	1884	454	1096	0.46	24.21	1.48	0.46	14.61	0.95	0.29	4.49	0.79	17000	27	1414	86	24	972	69	3	442	17	11.7	31.2	19.6
P	1988-93	P	F	5337	2942	465	1930	0.46	24.21	0.64	0.46	14.61	0.64	0.29	4.49	0.79	17000	42	2197	58	36	1474	63	6	723	-5	13.2	32.9	-8.3
P	1988-93	P	P	45207	23079	9787	12341	0.46	6.52	1.48	0.46	6.52	0.95	0.29	4.49	0.79	17000	354	5012	1135	319	4587	903	35	425	232	10.0	8.5	20.5
P	1988-93	P	P	710735	710735			0.17	2.64	0.38							17000	2008	31877	4536	2008	31877	4536						
P	1994-2001	F	F	2184	1345	192	647	0.50	7.05	1.34	0.50	3.87	1.19	0.13	2.50	0.23	22000	24	339	64	19	261	48	5	78	16	21.6	23.1	25.5
P	1994-2001	F	F	3695	2079	250	1366	0.50	7.05	0.15	0.50	3.87	0.15	0.13	2.50	0.23	22000	41	573	12	30	419	15	11	154	-2	27.0	26.9	-18.8
P	1994-2001	F	P	1208	722	147	339	0.50	2.81	1.34	0.50	2.81	1.19	0.13	2.50	0.23	22000	13	75	36	11	72	27	3	2	9	20.5	3.1	24.6
P	1994-2001	F	P	1901	1085	166	650	0.50	2.81	0.15	0.50	2.81	0.15	0.13	2.50	0.23	22000	21	116	6	16	113	7	5	4	-1	24.8	3.8	-17.3
P	1994-2001	P	F	630	341	63	226	0.32	7.05	1.34	0.32	3.87	1.19	0.13	2.50	0.23	22000	4	98	19	4	71	13	1	27	8	20.9	27.7	30.8
P	1994-2001	P	F	3242	1611	221	1410	0.32	7.05	0.15	0.32	3.87	0.15	0.13	2.50	0.23	22000	23	503	11	17	346	13	8	157	-2	25.4	31.2	-22.1
P	1994-2001	P	P	7298	4511	1041	1746	0.32	2.81	1.34	0.32	2.81	1.19	0.13	2.50	0.23	22000	52	452	215	45	440	169	7	12	46	13.9	2.7	21.3
P	1994-2001	P	P	890797	890797			0.13	1.82	0.23							22000	2548	35573	4507	2548	35573	4507						
T	1980-87	F	F	1338	575	401	362	2.35	34.28	3.15	2.00	25.18	2.55	0.97	12.31	1.50	12000	38	550	51	30	411	41	8	139	10	20.2	25.3	20.0
T	1980-87	F	F	7019	3005	1833	2181	2.35	34.28	1.07	2.00	25.18	1.07	0.97	12.31	1.50	12000	198	2888	90	154	2112	101	44	778	-11	22.0	26.9	-12.5
T	1980-87	F	P	2653	852	748	1053	2.35	11.98	3.15	2.00	11.98	2.55	0.97	12.31	1.50	12000	75	381	100	54	385	74	20	-4	26	27.4	-1.1	28.[illegible]
T	1980-87	F	P	3503	1181	796	1526	2.35	11.98	1.07	2.00	11.98	1.07	0.97	12.31	1.50	12000	99	503	45	70	509	53	28	-6	-8	28.9	-1.2	-17.5
T	1980-87	P	F	530	223	143	164	1.46	34.28	3.15	1.46	25.18	2.55	0.97	12.31	1.50	12000	9	218	20	8	159	16	1	59	4	10.4	27.0	21.5
T	1980-87	P	F	2312	1097	468	747	1.46	34.28	1.07	1.46	25.18	1.07	0.97	12.31	1.50	12000	40	951	30	36	703	33	4	248	-4	10.8	26.1	-13.0
T	1980-87	P	P	4085	1555	1145	1385	1.46	11.98	3.15	1.46	11.98	2.55	0.97	12.31	1.50	12000	72	587	155	63	593	119	8	-5	36	11.3	-0.9	23.2
T	1980-87	P	P	28827	28827			0.57	9.19	1.27							12000	196	3178	441	196	3178	441						
T	1988-93	F	F	5308	2528	965	1815	1.92	26.24	1.91	1.80	20.19	1.80	0.46	8.77	0.92	17000	174	2368	173	127	1730	140	47	638	33	27.1	27.0	18.8
T	1988-93	F	F	15692	7965	2061	5666	1.92	26.24	0.54	1.80	20.19	0.54	0.46	8.77	0.92	17000	513	7001	145	368	5106	181	145	1895	-37	28.2	27.1	-25.3
T	1988-93	F	P	5610	2859	899	1852	1.92	10.24	1.91	1.80	10.24	1.80	0.46	8.77	0.92	17000	184	977	183	136	930	150	48	46	33	28.1	4.7	18.1
T	1988-93	F	P	12275	5711	1690	4874	1.92	10.24	0.54	1.80	10.24	0.54	0.46	8.77	0.92	17000	402	2137	113	277	2015	144	125	122	-31	31.0	5.7	-27.8
T	1988-93	P	F	915	438	155	322	1.01	26.24	1.91	1.01	20.19	1.80	0.46	8.77	0.92	17000	16	408	30	13	297	24	3	112	8	19.0	27.3	19.3
T	1988-93	P	F	1645	873	186	576	1.01	26.24	0.54	1.01	20.19	0.54	0.46	8.77	0.92	17000	28	734	15	23	543	18	5	191	-4	16.9	26.1	-24.5
T	1988-93	P	P	8759	4219	1879	2661	1.01	10.24	1.91	1.01	10.24	1.80	0.46	8.77	0.92	17000	150	1525	285	125	1458	236	24	67	49	16.4	4.4	17.0
T	1988-93	P	P	185088	185088			0.46	8.08	0.92							17000	1447	19120	2895	1447	19120	2895						
T	1994-2001	F	F	1144	532	188	424	0.50	7.05	1.40	0.50	3.87	1.19	0.18	3.41	0.50	22000	13	177	35	10	130	26	3	47	9	24.1	26.6	26.4
T	1994 2001	F	F	2097	1196	144	757	0.50	7.05	0.24	0.50	3.87	0.15	0.18	3.41	0.50	22000	23	325	11	18	255	15	5	71	-4	23.4	21.7	-34.9
T	1994-2001	F	P	289	146	39	104	0.50	2.81	1.40	0.50	2.81	1.19	0.18	3.41	0.50	22000	3	18	9	2	19	7	1	-1	2	23.4	-7.7	25.3
T	1994-2001	F	P	1256	741	120	395	0.50	2.81	0.24	0.50	2.81	0.15	0.18	3.41	0.50	22000	14	78	7	11	83	9	3	-5	-2	20.4	-6.7	-29.1
T	1994-2001	P	F	197	148	12	37	0.32	7.05	1.40	0.32	3.87	1.19	0.18	3.41	0.50	22000	1	31	6	1	27	5	0	4	1	8.4	12.4	13.0
T	1994-2001	P	F	364	208	27	129	0.32	7.05	0.24	0.32	3.87	0.15	0.18	3.41	0.50	22000	3	56	2	2	44	3	0	12	-1	15.9	21.6	-34.1
T	1994-2001	P	P	1756	1012	204	540	0.32	2.81	1.40	0.32	2.81	1.19	0.18	3.41	0.50	22000	12	109	54	11	116	42	2	7	12	13.8	-6.6	21.6
T	1994-2001	P	P	367873	367873			0.18	3.41	0.50							22000	1418	27581	4015	1418	27581	4015						
																	TOTAL	15954	233082	27039	14438	212191	26151	1517	20892	887	9.5	9.0	3.3

Table 3C: 2001 - Phase 1: Calculation of emission reductions by vehicle type and by age group

									INITIAL RESULT g/km			FINAL BAD REPAIR g/km			FINAL GOOD REPAIR g/km				row total INITIAL H505 Mg			row total FINAL H505 Mg			row total REDUCTION H505Mg			row total % REDUCTION		
vehicle type	model years	HC result	CO result	NO result	number in fleet with initial condition	number not changing	number achieving bad final result	number achieving good final result	HC	CO	NO	HC	CO	NO	HC	CO	NO	ANNUAL km	HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	ND
P&T	pre-81				94000				1.25	15.63	1.94							7000	823	10281	1275	823	10281	1275						
P	1981-87	F	F	F	4330	2226	777	1327	2.35	34.28	3.15	2.00	25.18	2.55	0.97	12.31	1.50	12000	122	1781	164	97	1346	132	25	435	32	20.6	24.4	19.6
P	1981-87	F	F	P	20935	11331	3128	6476	2.35	34.28	1.07	2.00	25.18	1.07	0.97	12.31	1.50	12000	589	8813	268	470	6563	301	120	2050	-33	20.3	23.8	-12.4
P	1981-87	F	P	F	5626	2858	1012	1756	2.35	11.98	3.15	2.00	11.98	2.55	0.97	12.31	1.50	12000	158	808	213	125	815	171	33	7	42	20.9	-0.9	19.9
P	1981-87	F	P	P	5911	3113	989	1829	2.35	11.98	1.07	2.00	11.98	1.07	0.87	12.31	1.50	12000	166	840	76	132	857	85	34	-7	-9	20.5	-0.9	-12.4
P	1981-87	P	F	F	1354	656	188	510	1.46	34.28	3.15	1.48	25.18	2.55	0.97	12.31	1.50	12000	24	557	51	21	402	40	3	155	12	12.6	27.8	22.5
P	1981-87	P	F	P	6800	3798	650	2352	1.46	34.28	1.07	1.46	25.18	1.07	0.97	12.31	1.50	12000	119	2798	87	105	2108	99	14	691	-12	11.5	24.7	-13.9
P	1981-87	P	P	F	16999	8292	3972	4735	1.46	11.98	3.15	1.48	11.98	2.55	0.97	12.31	1.50	12000	298	2443	844	270	2462	520	28	-19	123	9.3	-0.8	19.2
P	1981-87	P	P	P	121021	121021			0.57	9.19	1.27							12000	821	13341	1849	821	13341	1849						
P	1988-93	F	F	F	20252	8879	3013	8360	0.99	24.21	1.48	0.60	14.61	0.95	0.29	4.49	0.79	17000	340	8337	509	221	5042	383	119	3294	125	34.9	39.5	24.6
P	1988-93	F	F	P	31842	14229	3828	13585	0.99	24.21	0.64	0.80	14.61	0.84	0.28	4.49	0.79	17000	531	13025	343	345	7846	377	186	5179	-34	35.0	39.8	-9.9
P	1988-93	F	P	F	13802	6077	2395	5330	0.99	6.52	1.48	0.80	8.52	0.95	0.29	4.49	0.78	17000	232	1530	347	153	1346	283	79	184	84	34.0	12.0	24.2
P	1988-93	F	P	P	17824	7488	3474	6862	0.99	6.52	0.64	0.60	6.52	0.64	0.29	4.49	0.79	17000	298	1954	191	194	1724	208	102	230	17	34.4	11.7	-8.7
P	1988-93	P	F	F	2806	1154	432	1220	0.48	24.21	1.48	0.46	14.61	0.95	0.29	4.49	0.79	17000	22	1155	70	19	676	52	3	479	18	15.9	41.5	25.8
P	1988-93	P	F	P	4895	2029	632	2234	0.48	24.21	0.64	0.48	14.61	0.64	0.29	4.49	0.79	17000	38	2015	53	32	1163	59	6	852	-6	16.7	42.3	-10.5
P	1988-93	P	P	F	37681	14589	9824	13238	0.46	6.52	1.48	0.46	6.52	0.95	0.29	4.48	0.79	17000	295	4175	946	257	3719	703	38	458	243	12.9	10.9	25.7
P	1988-93	P	P	P	810557	810557			0.17	2.64	0.38							17000	1725	27384	3897	1725	27384	3897						
P	1994-2001	F	F	F	2530	1081	322	1127	0.50	7.05	1.34	0.50	3.87	1.19	0.13	2.50	0.23	22000	28	393	74	19	257	46	9	135	28	32.5	34.5	38.4
P	1994-2001	F	F	P	4211	2082	330	1799	0.50	7.05	0.15	0.50	3.87	0.15	0.13	2.50	0.23	22000	48	654	14	32	450	17	14	203	-3	31.2	31.1	-21.7
P	1994-2001	F	P	F	1351	480	282	609	0.50	2.81	1.34	0.50	2.81	1.19	0.13	2.50	0.23	22000	15	84	40	10	79	24	5	4	16	32.9	5.0	39.4
P	1994-2001	F	P	P	2928	1356	366	1206	0.50	2.81	0.15	0.50	2.81	0.15	0.13	2.50	0.23	22000	32	181	10	23	173	12	10	8	-2	30.1	4.6	-20.9
P	1994-2001	P	F	F	762	438	74	252	0.32	7.05	1.34	0.32	3.87	1.19	0.13	2.50	0.23	22000	5	118	22	4	88	16	1	30	6	19.3	25.7	28.4
P	1994 2001	P	F	P	3811	1835	302	1874	0.32	7.05	0.15	0.32	3.87	0.15	0.13	2.50	0.23	22000	27	591	13	20	403	16	7	189	-3	25.6	31.9	-22.3
P	1994-2001	P	P	F	8152	3413	1791	2948	0.32	2.81	1.34	0.32	2.81	1.19	0.13	2.50	0.23	22000	58	504	240	48	484	182	12	20	78	21.1	4.0	32.3
P	1994-2001	P	P	P	995244	995244			0.13	1.82	0.23							22000	2846	39744	5036	2846	39744	5036						
T	1981-87	F	F	F	851	469	145	237	2.35	34.28	3.15	2.00	25.18	2.55	0.97	12.31	1.50	12000	24	350	32	19	272	26	5	78	6	18.8	22.4	17.9
T	1981-87	F	F	P	5359	3020	858	1480	2.35	34.28	1.07	2.00	25.10	1.07	0.97	12.31	1.50	12000	151	2205	69	123	1720	76	28	484	-8	18.5	22.0	-11.1
T	1981-87	F	P	F	2072	1195	254	623	2.35	11.98	3.15	2.00	11.98	2.55	0.97	12.31	1.50	12000	58	298	78	47	300	64	11	-2	14	19.4	-0.8	18.2
T	1981-87	F	P	P	3066	1620	337	909	2.35	11.98	1.07	2.00	11.98	1.07	0.97	12.31	1.50	12000	86	441	38	70	444	44	16	-4	-5	18.0	-0.8	-11.9
T	1981-87	P	F	F	297	158	49	90	1.46	34.28	3.15	1.46	25.18	2.55	0.97	12.31	1.50	12000	5	122	11	5	93	9	1	29	2	10.1	23.8	19.1
T	1981-87	P	F	P	1540	812	212	516	1.48	34.28	1.07	1.46	25.18	1.07	0.97	12.31	1.50	12000	27	634	20	24	474	22	3	159	-3	11.2	25.1	-13.5
T	1981-87	P	P	F	2883	1520	606	757	1.46	11.98	3.15	1.48	11.98	2.55	0.97	12.31	1.50	12000	50	414	109	46	417	90	4	-3	19	8.8	-0.7	17.9
T	1981-87	P	P	P	28490	28490			0.57	9.19	1.27							12000	180	2920	405	180	2920	405						
T	1988-93	F	F	F	4671	1891	837	1943	1.92	26.24	1.91	1.80	20.19	1.80	0.46	8.77	0.92	17000	153	2084	152	103	1421	118	50	663	34	32.7	31.8	22.6
T	1988-93	F	F	P	14222	6286	2068	5868	1.92	26.24	0.54	1.80	20.19	0.54	0.46	8.77	0.92	17000	465	6345	131	315	4389	169	150	1958	-38	32.2	30.8	-28.9
T	1988-93	F	P	F	5418	2068	1087	2281	1.92	10.24	1.91	1.80	10.24	1.80	0.46	8.77	0.82	17000	177	943	176	119	886	136	58	57	40	33.0	6.0	22.9
T	1988-93	F	P	P	12442	5233	1918	5293	1.92	10.24	0.54	1.80	10.24	0.54	0.48	8.77	0.92	17000	407	2166	115	272	2034	149	135	133	-34	33.3	6.1	-29.8
T	1988-93	P	F	F	738	332	128	280	1.01	26.24	1.91	1.01	20.19	1.80	0.48	8.77	0.92	17000	13	329	24	10	233	19	3	96	5	20.5	29.2	20.7
T	1988-93	P	F	P	1447	572	222	653	1.01	26.24	0.54	1.01	20.19	0.54	0.48	8.77	0.92	17000	25	646	13	19	429	18	6	217	-4	24.3	33.6	-31.
T	1988-93	P	P	F	7242	2856	1833	2553	1.01	10.24	1.91	1.01	10.24	1.80	0.46	8.77	0.92	17000	124	1261	236	100	1197	189	23	64	47	19.0	5.1	19.8
T	1988-93	P	P	P	169532	169532			0.46	6.08	0.92							17000	1326	17513	2651	1326	17513	2651						
T	1994-2001	F	F	F	1568	685	238	645	0.50	7.05	1.40	0.50	3.87	1.19	0.18	3.41	0.50	22000	17	243	48	13	175	34	5	68	14	26.7	28.1	28.8
T	1994-2001	F	F	P	2711	1328	238	1145	0.50	7.05	0.24	0.50	3.87	0.15	0.18	3.41	0.50	22000	30	420	15	22	312	20	8	108	-6	27.4	25.8	40.6
T	1994-2001	F	P	F	393	165	66	182	0.50	2.81	1.40	0.50	2.81	1.19	0.18	3.41	0.50	22000	4	24	12	3	26	9	1	-2	4	26.7	-8.8	29.
T	1994-2001	F	P	P	1498	831	245	622	0.50	2.81	0.24	0.50	2.81	0.15	0.18	3.41	0.50	22000	16	93	8	12	101	11	4	-8	-3	27.0	-8.9	-37.
T	1994-2001	P	F	F	268	102	52	112	0.32	7.05	1.40	0.32	3.87	1.19	0.18	3.41	0.50	22000	2	41	8	2	29	6	0	13	2	18.8	30.8	30.1
T	1994-2001	P	F	P	376	178	34	164	0.32	7.05	0.24	0.32	3.87	0.15	0.18	3.41	0.50	22000	3	58	2	2	43	3	1	18	-1	19.6	26.8	41.9
T	1994-2001	P	P	F	2064	651	421	992	0.32	2.81	1.40	0.32	2.81	1.19	0.18	3.41	0.50	22000	15	128	64	11	141	42	3	-13	22	21.5	10.2	34.
T	1994-2001	P	P	P	441859	441859			0.18	3.41	0.50							22000	1704	33127	4823	1704	33127	4823						
																		TOTAL	14719	218122	25673	13355	197451	24875	1365	18671	797	9.3	8.6	3.1

Table 3D: 2001 - Phase 2: Calculation of emission reductions by vehicle type and by age group

									INITIAL RESULT g/km			FINAL BAD REPAIR g/km			FINAL GOOD REPAIR g/km				row total INITIAL H505 Mg			row total FINAL H505 Mg			row total REDUCTION H505Mg			row total % REDUCTION		
vehicle type	model years	HC result	CO result	NO result	number in fleet with initial condition	number not changing	number achieving bad final result	number achieving good final rsult	HC	CO	NO	HC	CO	NO	HC	CO	NO	ANNUAL km	HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
P&T	pre-81				45000				1.25	15.63	1.94							7000	394	4922	610	394	4922	610						
P	1981-87	F	F	F	3642	1616	1247	779	2.35	34.28	3.15	2.00	25.18	2.55	0.97	12.31	1.50	12000	103	1498	138	85	1157	113	18	342	25	17.6	22.8	17.9
P	1981-87	F	F	P	14759	7062	4062	3635	2.35	34.28	1.07	2.00	25.18	1.07	0.97	12.31	1.50	12000	415	6072	189	339	4868	208	77	1402	-19	18.5	23.1	-9.9
P	1981-87	F	P	F	4599	2064	1464	1071	2.35	11.98	3.15	2.00	11.98	2.55	0.97	12.31	1.50	12000	129	661	174	106	665	142	24	-4	32	18.3	-0.6	18.4
P	1981-87	F	P	P	4858	2497	1173	1188	2.35	11.98	1.07	2.00	11.98	1.07	0.97	12.31	1.50	12000	137	698	62	112	703	68	24	-5	-6	17.9	-0.7	-9.8
P	1981-87	P	F	F	815	348	246	221	1.46	34.28	3.15	1.46	25.18	2.55	0.97	12.31	1.50	12000	14	335	31	13	250	25	1	85	6	9.1	25.4	20.1
P	1981-87	P	F	P	3457	1791	650	1016	1.46	34.28	1.07	1.46	25.18	1.07	0.97	12.31	1.50	12000	61	1422	44	55	1083	49	6	339	-5	9.8	23.8	-11.8
P	1981-87	P	P	F	11844	5409	4014	2421	1.46	11.98	3.15	1.46	11.98	2.55	0.97	12.31	1.50	12000	207	1702	448	193	1712	371	14	-10	78	6.8	-0.6	17.3
P	1981-87	P	P	P	56792	56792			0.57	9.19	1.27							12000	385	6261	868	385	6261	868						
P	1988-93	F	F	F	11060	4508	3246	3306	0.99	24.21	1.48	0.60	14.61	0.95	0.29	4.49	0.79	17000	186	4553	278	125	2915	210	61	1638	68	32.6	36.0	24.4
P	1988-93	F	F	P	16228	6796	3330	6102	0.99	24.21	0.64	0.60	14.61	0.64	0.29	4.49	0.79	17000	273	8680	176	178	4091	191	94	2589	-15	34.6	38.8	-8.7
P	1988-93	F	P	F	8506	3419	2825	2262	0.99	6.52	1.48	0.60	6.52	0.95	0.29	4.49	0.79	17000	143	943	214	97	865	162	45	78	52	31.8	8.3	24.2
P	1988-93	F	P	P	10899	4532	3054	3313	0.99	6.52	0.64	0.60	6.52	0.64	0.29	4.49	0.79	17000	183	1208	118	124	1094	127	59	114	-8	32.4	9.4	-7.0
P	1988-93	P	F	F	1284	498	354	432	0.46	24.21	1.48	0.46	14.61	0.95	0.29	4.49	0.79	17000	10	529	32	9	326	24	1	203	8	12.3	38.3	25.5
P	1988-93	P	F	P	2147	921	366	861	0.46	24.21	0.64	0.46	14.61	0.64	0.29	4.49	0.79	17000	17	884	23	14	536	25	2	348	-2	14.7	39.4	-9.3
P	1988-93	P	P	F	21755	8388	7145	6222	0.46	6.52	1.48	0.46	6.52	0.95	0.29	4.49	0.79	17000	171	2412	546	153	2197	410	18	214	137	10.5	8.9	25.0
P	1988-93	P	P	P	337112	337112			0.17	2.64	0.38							17000	952	15120	2151	952	15120	2151						
P	1994-2001	F	F	F	1165	458	306	401	0.50	7.05	1.34	0.50	3.87	1.19	0.13	2.50	0.23	22000	13	181	34	10	119	24	3	62	11	25.2	34.1	31.4
P	1994-2001	F	F	P	2422	1253	251	919	0.50	7.05	0.15	0.50	3.87	0.15	0.13	2.50	0.23	22000	27	376	8	19	266	10	7	110	-2	27.7	29.2	-19.3
P	1994-2001	F	P	F	684	228	236	220	0.50	2.81	1.34	0.50	2.81	1.19	0.13	2.50	0.23	22000	8	42	20	6	41	14	2	2	6	23.5	3.6	30.4
P	1994-2001	F	P	P	1115	460	210	445	0.50	2.81	0.15	0.50	2.81	0.15	0.13	2.50	0.23	22000	12	69	4	9	66	4	4	3	-1	29.2	4.4	-20.3
P	1994-2001	P	F	F	409	220	60	129	0.32	7.05	1.34	0.32	3.87	1.19	0.13	2.50	0.23	22000	3	63	12	2	46	9	1	17	3	18.4	27.0	27.7
P	1994-2001	P	F	P	2627	1308	253	1066	0.32	7.05	0.15	0.32	3.87	0.15	0.13	2.50	0.23	22000	19	408	9	14	283	11	4	125	-2	23.7	30.6	-20.6
P	1994-2001	P	P	F	4492	1760	1275	1457	0.32	2.81	1.34	0.32	2.81	1.19	0.13	2.50	0.23	22000	32	278	132	26	268	93	6	10	40	18.9	3.6	29.9
P	1994-2001	P	P	P	573398	573398			0.13	1.82	0.23							22000	1640	22898	2901	1640	22898	2901						
T	1981-87	F	F	F	1331	627	413	291	2.35	34.28	3.15	2.00	25.18	2.55	0.97	12.31	1.50	12000	37	548	50	31	426	42	7	122	9	17.4	22.3	17.5
T	1981-87	F	F	P	7264	3495	2116	1653	2.35	34.28	1.07	2.00	25.18	1.07	0.97	12.31	1.50	12000	204	2988	93	168	2321	102	36	667	-9	17.6	22.3	-9.1
T	1981-87	F	P	F	2875	1518	715	642	2.35	11.98	3.15	2.00	11.98	2.55	0.97	12.31	1.50	12000	81	413	109	67	416	91	14	-3	18	16.7	-0.6	16.5
T	1981-87	F	P	P	3387	1784	641	962	2.35	11.98	1.07	2.00	11.98	1.07	0.97	12.31	1.50	12000	95	487	43	77	491	48	19	-4	-5	19.4	-0.8	-11.4
T	1981-87	P	F	F	304	147	95	62	1.46	34.28	3.15	1.46	25.18	2.55	0.97	12.31	1.50	12000	5	125	12	5	98	10	0	27	2	6.8	21.3	16.7
T	1981-87	P	F	P	1736	776	443	517	1.46	34.28	1.07	1.46	25.18	1.07	0.97	12.31	1.50	12000	30	714	22	27	529	25	3	185	-3	10.0	25.9	-12.0
T	1981-87	P	P	F	3440	1656	1006	778	1.46	11.98	3.15	1.46	11.98	2.55	0.97	12.31	1.50	12000	60	494	130	56	497	107	5	-3	23	7.6	-0.6	17.5
T	1981-87	P	P	P	22168	22168			0.57	9.19	1.27							12000	150	2444	339	150	2444	339						
T	1988-93	F	F	F	4271	1516	1558	1197	1.92	26.24	1.91	1.80	20.19	1.80	0.46	8.77	0.92	17000	140	1905	139	107	1390	116	33	516	23	23.6	27.1	16.7
T	1988-93	F	F	P	13103	5349	3080	4674	1.92	26.24	0.54	1.80	20.19	0.54	0.46	8.77	0.92	17000	429	5846	121	306	4141	151	123	1705	-30	28.6	29.2	-25.0
T	1988-93	F	P	F	5260	1797	1927	1536	1.92	10.24	1.91	1.80	10.24	1.80	0.46	8.77	0.92	17000	172	916	171	130	877	142	42	38	30	24.5	4.2	17.3
T	1988-93	F	P	P	10993	3982	2766	4245	1.92	10.24	0.54	1.80	10.24	0.54	0.46	8.77	0.92	17000	360	1914	101	248	1808	129	111	106	-27	30.9	5.6	-27.0
T	1988-93	P	F	F	591	230	177	184	1.01	26.24	1.91	1.01	20.19	1.80	0.46	8.77	0.92	17000	10	264	19	8	191	16	2	73	3	16.7	27.6	17.9
T	1988-93	P	F	P	1214	482	266	466	1.01	26.24	0.54	1.01	20.19	0.54	0.46	8.77	0.92	17000	21	542	11	16	376	14	4	166	-3	20.7	30.6	-26.9
T	1988-93	P	P	F	5940	2164	1980	1796	1.01	10.24	1.91	1.01	10.24	1.80	0.46	8.77	0.92	17000	101	1034	193	85	989	159	17	45	34	16.3	4.3	17.7
T	1988-93	P	P	P	133658	133658			0.46	6.08	0.92							17000	1045	13807	2090	1045	13807	2090						
T	1994-2001	F	F	F	1051	440	272	339	0.50	7.05	1.40	0.50	3.87	1.19	0.18	3.41	0.50	22000	12	163	32	9	117	24	2	46	8	21.0	28.3	24.6
T	1994-2001	F	F	P	1760	815	214	731	0.50	7.05	0.24	0.50	3.87	0.15	0.18	3.41	0.50	22000	19	273	9	14	199	13	5	74	-4	27.0	26.9	-38.6
T	1994-2001	F	P	F	344	146	77	121	0.50	2.81	1.40	0.50	2.81	1.19	0.18	3.41	0.50	22000	4	21	11	3	23	8	1	-2	3	22.8	-7.5	26.0
T	1994-2001	F	P	P	893	351	208	334	0.50	2.81	0.24	0.50	2.81	0.15	0.18	3.41	0.50	22000	10	55	5	7	60	6	2	-4	-1	24.3	-8.0	-30.1
T	1994-2001	P	F	F	165	44	51	70	0.32	7.05	1.40	0.32	3.87	1.19	0.18	3.41	0.50	22000	1	26	5	1	16	3	0	9	2	18.8	35.8	31.9
T	1994-2001	P	F	P	342	156	52	134	0.32	7.05	0.24	0.32	3.87	0.15	0.18	3.41	0.50	22000	2	53	2	2	39	2	0	14	-1	17.5	27.1	-34.9
T	1994-2001	P	P	F	1525	419	448	658	0.32	2.81	1.40	0.32	2.81	1.19	0.18	3.41	0.50	22000	11	94	47	9	103	32	2	-9	15	19.2	-9.2	32.2
T	1994-2001	P	P	P	348941	348941			0.18	3.41	0.50							22000	1345	26161	3809	1345	26161	3809						
																		TOTAL	9878	141503	16789	8978	130072	16297	900	11431	492	9.1	8.1	2.9

Table 4A: Phase 1 Overall Emission Reductions, 1999-2001

	Vehicle Emissions Inventory				
	CO Tonnes	HC (VOCs) Tonnes	NOx Tonnes	HC + NOx Tonnes	(HC+NOx) % change
Initial (1999)	561,039	51,514	45,637	97,151	
Final (2001)	449,953	40,532	41,852	82,384	
Reduction	111,086	10,982	3,785	14,767	15.20%

Table 4B: Phase 2 Overall Emission Reductions, 2001

	Vehicle Emissions Inventory				
	CO Tonnes	HC (VOCs) Tonnes	NOx Tonnes	HC + NOx (VOCs)	(HC+NOx) % change
Initial (2001)	348,868	29,359	27,330	56,689	
Final (2001)	320,610	26,687	26,537	53,224	
Reduction	28,258	2,672	793	3,465	6.11%